BUTANE-PROPANE Technology News

RECOGNIZED AUTHORITY OF THE LIQUEFIED PETROLEUM GAS INDUSTRY

FEBRUARY, 1946

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• The Invention of the Meter Made Commercial Gas Service Practical

the 1840's when the use of gas meters was first mandatory in England, consumers, distrustful of strument, called it a "mystery box."

the gas meter, first invented in 1815 by Samuel proved the salvation for the industry. Previously d been sold on a contract basis with quantity and stimated by the number of hours it was consumed gh burners of a given size. Inspectors went their s at stipulated hours of the night to see that lights extinguished according to contract. This system d complaints and disagreements. It threatened the ife of these early utilities.

art of gas measurement has progressed through phases since Mr. Clegg's first crude device was de- ed. The gas meter of today is a highly perfected nism—one that will operate unobtrusively and tely for years without attention.

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BUTANE-PROPANE *News*

Reg. U.S. Pat. Off.

Contents for February, 1946

Letters	13
Comment	17
Beyond the Mains — *By Elliott Taylor*	19
Tests Prove Propane Best For Flame Cultivation in Cotton Fields — *By T. L. Baggette*	23
Easy To Install Supply Tanks With Special Trailer Unit — *By Paul Lady*	26
Howard D. White Named LPGA Executive Vice President	30
Pump Problems: Tank Truck Installation *By R. Stanley Smith*	32
Butane Group Attacks Accident Problem In True Texas Style	37
Training Servicemen: Range Servicing *By C. C. Westmoreland*	39
Commercial and Industrial Applications—Chapter 19: The Tailor Needs Gas — *By C. C. Turner*	48
Current Reading	64
Quiz: Thermostatic Control	69
Up Goes the Gas Load — *By G. M. Rohde, Jr.*	75
Furnace Adjustments in Shop Save Many Service Calls	84
New Products	88
Change-Over Methods and Practices In Adjusting Appliances for the Utilization of Higher Btu Gas—Part 2 — *By Robert L. Rundorff*	92
Power: The ABC's of Butane-Propane for Engine Use — *By E. A. Stratman*	110
The Trade	132
Classified	142
Advertisers	144

Publication Office

LOS ANGELES (14)—1709 W. Eighth St.
Phone: DRexel 4337

Branch Offices

CHICAGO (3)—1064 Peoples Gas Bldg.
Phone: WABash 2589
DAVID CARMAN, Manager

NEW YORK (17)—50 East 42nd Street
Phone: MURray Hill 2-4504
L. V. HOHL, Manager

Editorial

ELLIOTT TAYLOR, Editorial Director
LYNN C. DENNY, Editor
PAUL LADY, Assistant Editor
H. W. WICKSTROM, Technical Editor

Executive

JAY JENKINS, President and Publisher
ARTHUR ROHMAN, Vice President
JAMES E. JENKINS, Secy.-Treas.

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LETTERS

Have you service or operating problems? Submit them to us and our technical department will endeavor to help you.—Ed.

•

Gentlemen:

I am wondering if you can supply me with a typical analysis of the chemical limits of such items as sulphur, olefin, ASTM distillation characteristics; also Reid vapor pressures, heating values, odors, colors and any other tests which butane or propane must pass to be used for domestic and automotive use. Tolerances on these limits would be very handy.

While, no doubt, the C. P. products would be best for all around use, the costs of these pure products would, no doubt, be prohibitive. The above tolerances and limits requested would be to cover the average gas now available on a competitive market.

E. J. B.

California

We suggest that you try to obtain this information from George L. Tyler, secretary of the California Natural Gasoline Association, 510 West 6th St., Los Angeles.

Analysis, tolerance tests and chemical limits such as you refer to are generally worked out for each individual plant, but the California Natural Gasoline Association has prepared, from time to time, bulletins which include many of these which have been more or less standardized.—Ed.

•

Gentlemen:

In the question and answer column of a recent issue your first question concerns lifting of top burners when the oven burner is lighted.

We would like to point out one rather obvious cause for this difficulty that you have not covered in your answer. This condition may frequently be caused by a poor oven door seal or a plugged oven vent, or a combination of the two. This causes products of combustion from the oven to be vented out through the oven door and the natural chimney effect of the top burners can draw in the products of combustion to the top burners as primary air, causing the top burners to have all the indications of lack of air.

G. M. JOHNSTON,
Norge Appliance Service Dept.,
Borg-Warner Corp.

Michigan

You cite a very common instance of burner operation in ovens and your statement will be of value to our readers.—Ed.

•

Gentlemen:

We would appreciate your giving us the names and addresses of manufacturers of gas lighting fixtures and systems.

This may seem to be a rather odd request, but we do occasionally run into an application problem, where it is obviously expensive to operate a power plant continuously merely to keep a few lights energized.

Our purpose would be to install gas lighting to take care of such situations.

J. B. B.

Missouri

The General Gas Light Co., Kalamazoo, Mich., makes gas light fixtures and if you will send for their catalog I am sure that you will be able to make a selection that will serve your purposes.—Ed.

•

Gentlemen:

From time to time we have read in your magazine an article or two on B-P Gas weed burners. We have

lost or misplaced the magazines that contained these articles.

We definitely will be interested in buying weed burners, and prefer to buy from manufacturers who have perfected their burners past the experiment stage.

R. B.

Texas

The Pacific Electric Co. in Los Angeles and the Arizona Highway Commission have developed their own weed burners to meet their specific needs.

In the pages of BUTANE-PROPANE *News* will be found the advertisements of several firms which make special burners for such equipment.—Ed.

•

Gentlemen:

In your December issue you carried a story about the development of our industry in Missouri. Among other pictures, you showed two of very ancient tanks—rivited ones that have seen better days. I'm surprised that you would display such pictures.

P. L.

California.

The article referred to is a historical record and the pictures were taken a long time ago. The battered tank may not even be in use today, but should it be, maybe the owner will take a tip from you and buy a new one.—Ed.

•

Gentlemen:

Would like any literature available on conversion of natural gas appliances to propane.

G. O. L.

Missouri

This is a common practice, especially where operating gas town plants change over to butane or propane and it becomes necessary to change the appliances in the homes of all users. It is also done upon occasion when natural gas has been the original fuel.

Generally speaking, it is necessary to decrease the size of the orifice and often to raise the burners.

The subject is exhaustively covered in The Bottled Gas Manual by C. C. Turner and published by us.—Ed.

Gentlemen:

Please inform me on how to val propane and butane on a Btu bas Can butane be operated in cookin and heating for less money tha propane?

I am somewhat confused on ho to value the Btu energy between th two. I note the Btu is in favor o butane in gallons of liquid and cost less than propane per gallon an when vaporized propane produce more energy, or Btu, at the orifice or burner opening. Am I correct?

R. G.

Michigan

If you will refer to the "Handbook Butan Propane Gases," Page 22, you will note tha propane contains 21,692 Btu's per pound, an butane 21,338. If you were buying on a poun basis there is practically no difference.

Butane, however, weighs 4.86 pounds pe gallon and propane only 4.23 pounds per gallon At the same price per gallon butane is cheaper.

Butane contains 103,703 Btu's per gallon and propane 91,757 Btu's per gallon. Regardless of the Btu content of the gas produced you will only get the number of Btu's at the burner that you bought in the liquid form.—Ed.

•

Gentlemen:

Please furnish us names and addresses of insurance companies who specialize in products liability insurance covering B-P Gas operations acceptable in the State of Louisiana.

A. E. R.

Louisiana

I regret that I cannot provide you with the name of any products liability insurance company in Louisiana which writes coverage for liquefied petroleum gas dealers.

Undoubtedly there are such companies but I do not know their names. I suggest that you write to Hamlet D. May, executive secretary of the Louisiana Butane Dealers Association, Inc., P.O. Box 1871, Baton Rouge. He may be able to give you the names of suitable companies.—Ed.

• **BUTANE-PROPANE** *News* **welcomes letters from our readers, but it must be understood that this magazine does not necessarily concur in opinions expressed.—Editor.**

COMMENT

HOME construction will soar in 1946, in spite of labor and material shortages. Maybe 500,000 new dwellings will be built.

This will call for new appliances, with more emphasis on space heating than ever before.

Much new construction will be in small towns and the country, where liquefied petroleum gas is the logical fuel. But dealers will do well to sell the idea of gas before homes are completed. This means close contacts with architects, builders and home owners.

Don't let the electric boys beat your time!

•

No one can read the estimate on marketed production of B-P Gases in 1945 by G. G. Oberfell and Ross W. Thomas (January issue, pages 27-34) without realizing the butane-propane industry is headed for a great future.

Already the billion-gallon mark has been passed!

The quickest way dealers can double this—and double their profits at the same time—is to work for a better balance in seasonal loads. Nearly every community offers new avenues for sales—industrial, commercial, agricultural, automotive.

Seek them out—and sell them!

•

Gas industry fire losses are low, says a recent survey. In 1945 gas and gas appliances caused only 6/10 of 1% (estimated) of U. S. fires.

On the other hand, "electrical fixed services" accounted for 9½% of the total.

•

One of the attractive, potential fields for dealers is in power applications — conversions of gasoline and diesel engines to burn butane or propane, and the big fuel load that quickly follows.

This branch of dealer activity is destined to spread throughout the country and those not familiar with present practices in the West and Southwest will profit from reading E. A. Stratman's article—Page 110.

•

In a whirlwind manner, rivalling a Texas norther, the Texas Butane Dealers Association has tackled the problem of accident prevention in that state. It is not to be a willy-nilly movement limited to written resolutions but will be an out-and-out attack against carelessness and ignorance which, if not checked, will reflect upon the whole industry.

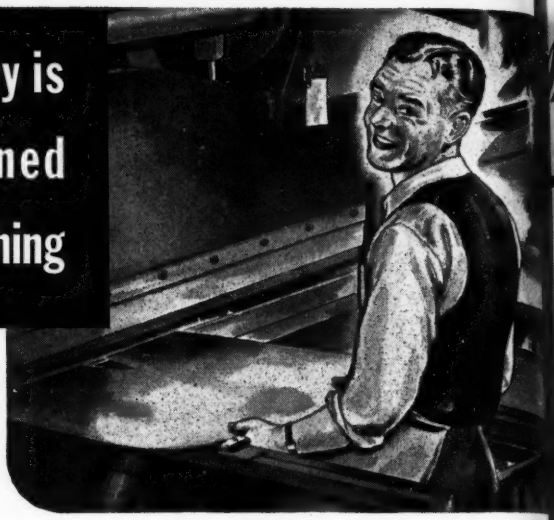
Dealers everywhere talk about safety (and the industry has an enviable record) but no one has gone after the problem in the business-like manner that the Texas Association members are showing. They mean to prevent accidents, if possible, to find out what causes accidents that occur, to find repetitions of accidents due to the same causes, and to compile this information so that insurance companies will be able to estimate the actual risks and to base rates accordingly. (Page 37.)

•

How small businesses may obtain credit and capital for sound business ventures is explained in a bulletin on "Credit Sources for Small Business" issued Jan. 4 by the U. S. Department of Commerce. Those desiring copies may address the Superintendent of Documents, Washington 25, D. C. The price is 15 cents a copy.

By Ed.

My Company is old-fashioned in just one thing



"I've been with PAYNE a good many years. We keep ahead of the field in gas warm air heating . . . but we're *old-fashioned* in one respect:

QUALITY COMES FIRST AROUND HERE!

"That's one reason our Company has grown in 30 years from a small tin shop to a major industry, known and respected coast to coast and in foreign lands. So naturally, I like to work for 'PAYNEHEAT.'"

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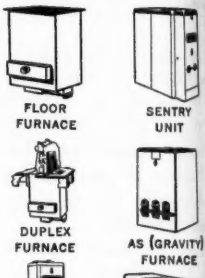

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Successor to old-fashioned central heating.
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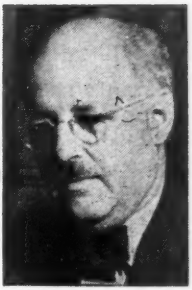
PAYNEHEAT
OVER 30 YEARS OF LEADERSHIP

GAS FUEL (HAS) EVERYTHING

Beyond the Mains



By ELLIOTT TAYLOR

New LPGA Deal

It's been a long time coming, but the executive committee of the Liquefied Petroleum Gas Association has finally approved practically the whole plan of reorganization and expanded activity for the association, and from here on out the success or failure of the endeavor will be up to the members and those in the industry who should be members.

The national headquarters are being moved to Chicago. That probably doesn't make much difference one way or another, except that it represents a concession to those who have loudly denounced the centralization of control in the East, and who have succeeded in making it look as if that in itself was a matter of sinister significance.

Getting the liquefied gas association out from under the wing of the Compressed Gas Manufacturers Association is a move that will no doubt be as welcome to the members of the latter organization as it is to many in the LPGA. We feel that it is about time for the LPGA to stand on its own feet, and while this move will cost the members more money, it will give them a sense of independence that they should regard as well worth the price.

Frank Fetherston, who has guided the destinies of the LPGA in fair weather and foul for many years, was deservedly elevated to a newly created post of vice president of the technical division, with his headquarters remaining where they have always been, in New York City. In technical matters and particularly in relations with the Interstate Commerce Commission and the National Board of Fire Underwriters, the interests of liquefied gas and those of other compressed gases are often similar if not identical.

As executive secretary of the Compressed Gas Manufacturers Association, Fetherston is probably in closer and more effective contact with all of these ramified problems than any man in the country. It would have been unthinkable to have sacrificed

the valuable service that he can continue to render.

Around the new top flight position of executive vice president, to which Howard D. White, of Chicago, has been elected, the whole behind-the-scenes controversy in association ranks has raged. Those who wanted this job created have looked on it as a spot for a supersalesman who could go out and bring in new members to swell both the ranks and the coffers of the organization. That is no easy assignment, and without ever having discussed the matter with Vice President White, we feel safe in assuming that he relies heavily on member cooperation to help him move toward the goal of a greatly enlarged LPGA.

Certainly if the expansion-minded members of that association feel that the mere hiring of a man, any man, no matter how good he may be, will relieve them of a share in the responsibility for his ultimate success, they are optimistic beyond any rational justification.

We have long felt that the weakness in the association lay in the fact that it had too few of the rank and file of butane and propane dealers on its membership rolls. This can be overcome in time by an intensive membership drive to the more-or-less independent dealers. But it can be remedied a lot faster, and with a great deal more evidence of good faith on the part of the big distributors and marketers of the gases if they co out squarely for a platform association membership for of their own retailers.

That the association will ma provisions whereby they can e roll without facing prohibiti fees, is of course a basic assum tion. Just as it is basic th once in, they are to be treate as members each with a vot and not as business morons, t dull to be trusted with a ballo

President Fannin, in announ ing the far reaching rehabilit tion plans for the LPGA, h said, "The program is bei geared to bring uniform benefi to all parts of the industry. We are for that 100%, especiall if President Fannin, when h says "all parts," means **all** part

From Far Horizons

A job in the circulation de partment of Butane-Propan **News** must seem like the answe to a stamp collector's prayer a about this time of year whe subscriptions and renewals com in from literally all four corner of the earth. From Turkey an Palestine on one side of th globe, and then from Australi and New Zealand, down under.

Now again there comes ma from the reborn state of Czecho slovakia, and from the liberate French Republic, the Nether lands and Belgium. Old Ferdin and Magellan looks of from th **correio del Portugal** stamp, an

Mariano Moreno from that of the Republic of Argentina.

From nearer neighbors, as well, they come, there are covers, as the philatelists call them, from Canada, Mexico, Bermuda, Panama and Ecuador. To list them all would be an occupation either as monotonous, or as fascinating, as an impromptu evening journey through the Atlas.

But to brag about a publication's circulation is a prerogative of the business office, and not a proper subject of editorial discussion. We are fascinated, rather, by the evidence thus presented of the universal world-wide scope that is attaching to this so-typical an American industry—liquefied petroleum gas. Even characteristically American is the fact that it was not born on our shores, but came through an alien—an unknown and little respected immigrant from Bavaria in 1903.

As with many newcomers, it was in the land to which it emigrated that it had its great development; even as recently as a score of years ago the whole industry amounted to a production of butane, propane and pentane totalling less than half a million gallons. Then a few hundred domestic consumers largely in the immediate neighborhood of the natural gasoline plants or refineries were all of the public that had ever heard of bottled gas, or tank gas as it was variously called.

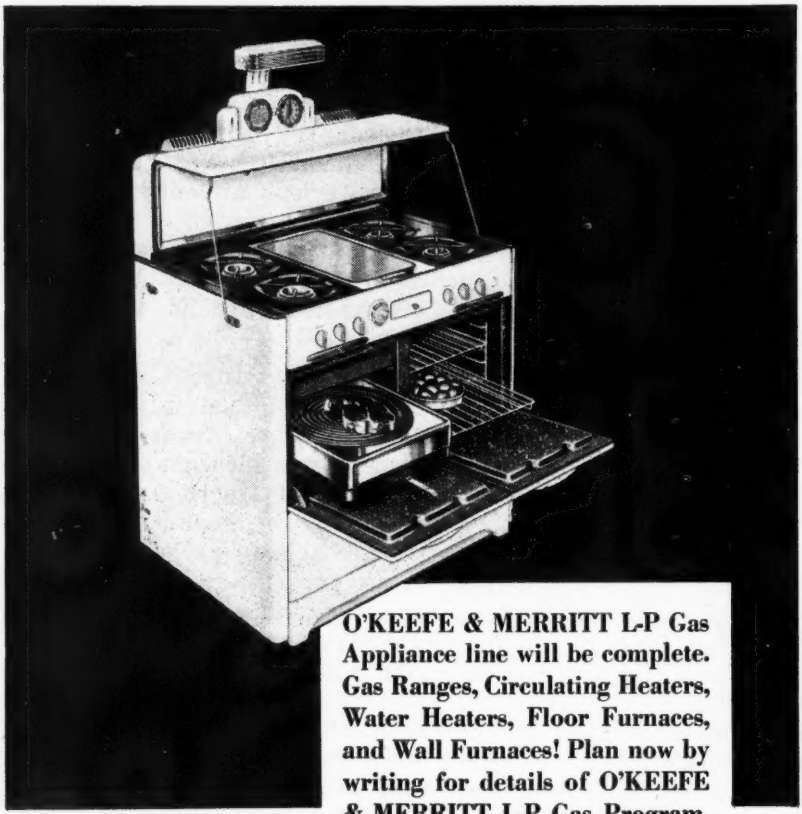
The production of these gases in the United States exceeded the billion-gallon mark for 1945, according to estimates, and the number of domestic consumers are right now well over two million, or 10% of all of the consumers of any kind of gas, either manufactured or natural, for domestic uses.

Thus, like many another alien that found opportunity waiting in the United States, liquefied gas has grown to the place where it is no longer in the role of beneficiary, alone, but also plays the part of benefactor to the country of its adoption. And, as evidenced by the postmarks that we look at today, the wisdom and experience that have been gained here are now sought after by the older and earlier civilizations around the entire world.

And for our part, as publishers to the industry, we find in these stamps from far-away places a gratification beyond the reaches of mere commercial gain. To the small extent that we are able to gather and pass on a portion of the store of knowledge and know-how of the industry, we feel that we also join with it and its operators in fulfilling a measure of America's obligation toward the establishment of a new world of unity and progress — a world which millions have devoutly hoped and prayed would be the world of 1946.

O'Keefe & Merritt

THE time is here when you can get set with the gas range line that is known wherever it is sold as the line with more extra and exclusive features



O'KEEFE & MERRITT L-P Gas Appliance line will be complete. Gas Ranges, Circulating Heaters, Water Heaters, Floor Furnaces, and Wall Furnaces! Plan now by writing for details of O'KEEFE & MERRITT L-P Gas Program.

O'KEEFE & MERRITT • **3700 E. Olympic Blvd., Los Angeles 23, Calif.**

Tests Prove Propane Best

For Flame Cultivation in Cotton Fields

Report on Preliminary Studies Conducted at the Delta Experiment Station, University of Mississippi, on the Use of Bottled Gas as a Source of Fuel in the Operation of the Flame Cultivator

By T. L. BAGGETTE

Engineer, Mechanical Production of Cotton and Other Crops, Stoneville, Mississippi

THESE studies were conducted jointly with the Philgas Division, Phillips Petroleum Co., Bartlesville, Okla., and handled by their representative, Wayne C. Peck; the Delta Experiment Station, Stoneville, Miss., and the Fijelen Research and Development Co., Washington, D. C. They were carried on during the latter part of the 1945 cotton cultivation season; therefore, no information was obtained on the use of this type fuel for the early growing crop. This was observed in other places, however, and it appeared to be doing a satisfactory job.

The purpose was to duplicate, if possible, the field results previously demonstrated with the oil-air burner type of flame cultivator by substituting bottled gas as a fuel.

In making a comparison of the two kinds of fuel, the burner is the critical part of the mechanism. Several things had to be considered in order to judge the results of one operation against another:

First, the oil-air burner gave a blast effect in its flame which was necessary in killing grass and weeds and which gas burners might not be able to maintain at all times. These gases are under pressure, it is true, but when the gas vapors are burned as was planned, the pressure desired might not hold up until all liquid gas in the tank is used up.

Second, can a temperature high enough to kill grass and weeds be constantly maintained by using amounts of gas comparable to fuel oil consumed? Will the machine be as economical to operate as the oil burner? It was believed if these questions could be answered in the affirmative, the future use of bottled gas for flame cultivation might be assured, since other factors were all in its favor.

A machine was assembled that could operate in the field and have all the features of the oil-air machine such as a power lift, spark plugs to ignite the burners, and

FLAME WEEDING with B-P Gas is rapidly assuming importance in agricultural areas for row crops. Experimental work has been carried on for several seasons by State agricultural schools, the U. S. Department of Agriculture, and individuals.

Considerable progress has been made in determining practical equipment and methods. Results of field work will be given readers of BUTANE-PROPANE NEWS as rapidly as facts can be obtained.

As a source of fuel sales, flame weeding has big possibilities and may become an important factor in aiding dealers to attain two vital ends—make more profit and GAIN A BETTER LOAD BALANCE!

Mr. Baggette presents a report upon his efforts to solve this problem. Experiences of other men and institutions are invited in the interest of farmers needing information and equipment, and B-P Gas dealers seeking additional outlets for the products they sell.—Editor.

operating controls within easy reach of the operator.

Butane was first tried and it was found that it would not gasify in sufficient quantity to supply a 2-row flame cultivator for more than two hours without the pressure dropping below that required for satisfactory operation. Next, a mixture of butane and propane was used with similar results. From these results, it was concluded:

If either of the above is to be used, then an accompanying system for gasifying will have to be added, if gas rather than the liquid form of these gases is to be used. A number of such methods have been used to our knowledge; however, none with which we are familiar complies with Mississippi safety regulations.

Propane Won Out

The next step was to try propane, alone, and this was the gas used in these studies. Sufficient quantities of gas were generated to keep the 2-row burners going until there was only 10% liquid left in the tank. Since the tank used in these studies was 70 gallon water capacity and filled to 90% (63 gallons) with the propane, all except approximately 10 gallons was consumed before satisfactory operating pressure was lost. At the rate of 8 gallons per hour, this tank could easily supply one-half day of operation.

As the propane was withdrawn from the large storage tank, the time of filling the tank on the flame cultivator was increased. This job of filling the small supply tank from the storage tank was accomplished by connecting them with a hose. A slight difference of pressure between the small and large tanks caused the gas from the large tank to flow into the small tank when the valve was opened.

It was observed during these studies that, regardless of the burner used, the effective width of the flame pattern was in all cases the same as the diameter of the

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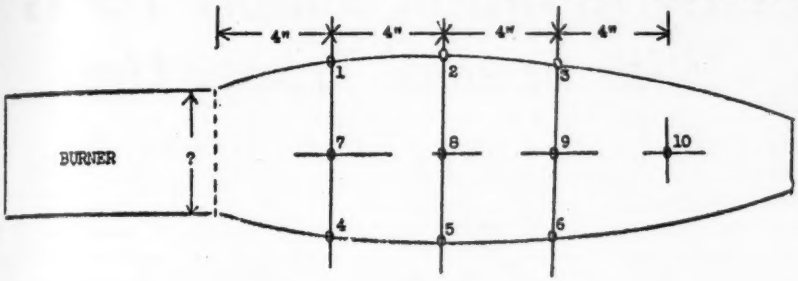


FLAME TEMPERATURE STUDIES*

Fuel Used		*Fuel Used*		*Fuel Used*	
Kerosene Air Pressure 50-55 lbs.		**Propane Fuel Pressure 20 lbs.**		**Propane Fuel Pressure 40 lbs.**	
Temperatures		*Temperatures*		*Temperatures*	
1.	1775°	1.	2055°	1.	2000°
2.	1820°	2.	2105°	2.	2050°
3.	1660°	3.	1950°	3.	2025°
4.	1685°	4.	1860°	4.	1960°
5.	1775°	5.	1980°	5.	1975°
6.	1840°	6.	1945°	6.	1780°
7.	2005°	7.	2075°	7.	2025°
8.	1985*	8.	2110°	8.	2180°
9.	1935°	9.	1850°	9.	2040°
10.	1775°	10.	1335°	10.	1845°
Av. temperature	1825°	Av. temperature	1926°	Av. temperature	1988°

*These were selected from many studies made to show how tests were recorded.

mouth of the end of the burner. The length of the flame was dependent on the pressure and ranged from 10 inches to 18 inches. A driving flame 12 inches to 14 inches long is sufficient to saturate the crop row which is the point at which the flame is directed.

The results of these studies were very satisfactory and proved the point that an equal, if not better, job is done in killing grass, vines, and weeds when using bottled gas than when using the present oil-air flame cultivator.

•

The New Holland Machine Co. of New Holland, Pa., will handle the distribution of flame weeding machines that are to be built by the Dixie Metal Products Co., Bessemer, Ala., and the Servis Equipment Co., Dallas, Texas. The plans at the present time are for these companies to build at least 1000 machines, a majority of which are to be 4-row implements.

Easy to Install Supply Tanks With Special Trailer Unit

By PAUL LADY

TRANSPORTATION of liquefied petroleum gas tanks has always been a problem. It is often costly and can consume much valuable time. Many dealers have tried to find easier and faster methods of delivering tanks to customers with varying success. How one dealer did succeed is told and illustrated below.

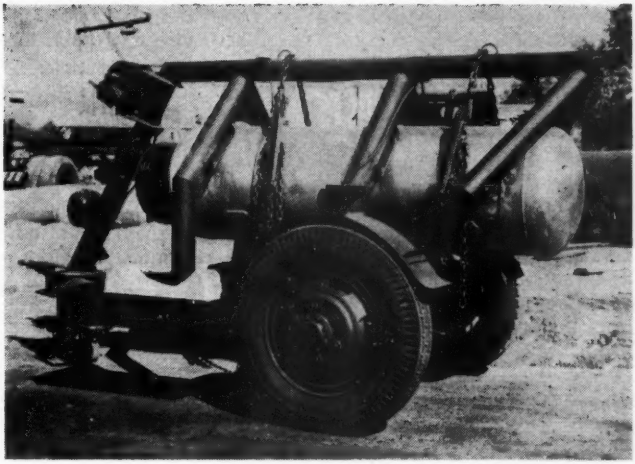
The company that has perfected this unique method of hauling B-P Gas tanks from storage to customer's premises, is the Fannin Gas and Equipment Co., of Phoenix, Ariz. Having proven that the plan is feasible, they passed it on so other dealers may profit by their experience.

It many be called a trailer—or any other name, if you like. It is, in fact, a trailer that can be fastened onto trucks of various sizes and it bears a license issued for trailers by the state of Arizona.

The Fannin model is designed to haul tanks of 80, 150 and 300 gals. on the highway and over rough, uneven ground. It facilitates handling of these various sized tanks by making it possible to pick them up at the storage yard, carry them to their destination and drop them at a predetermined spot without the usual lifting and hauling by hand.

As may be seen in the accom-

Cylinder-packing trailer of Fannin's Gas & Equipment Co., Phoenix, Ariz., hooked up to truck and ready to be delivered to customer.



The Fannin trailer and cylinder showing supporting framework and tying method.

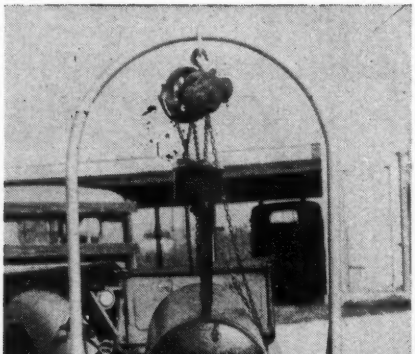
panying pictures, the tanks are hoisted from the ground by a winch built into the trailer. They are chained by a ⅜-in. log chain on booms. There are no cross-bars or framework between tank and ground so that the tank can be lowered directly at location. This is the second of this type trailer built by the Fannin organization and both have proven their worth so conclusively that they have now become standard equipment in the transportation of tanks for this company.

Besides the elimination of lifting and repeated handling, the trailer has simplified other tank delivery problems. Easily maneuvered, it can be backed over holes dug for underground storage and the tank lowered directly into the hole. If cement blocks are used, as for foundations for above-ground tanks, the trailer can be backed into position directly over the blocks, quickly and easily. There is never any lifting, as the winch makes possible setting the tank on foundation with a minimum of effort.

The expense of building this type conveyance is comparatively small, depending, of course, on how elaborate the dealer wishes to make it and the type of material used.

The Fannin trailer shown is made of 4-in. pipe. All welded construction is used on joints and frame. The axle is one from a truck taken out of service because of age. Tires used are those removed from a delivery truck because they had worn thin—but not too thin for this type of service.

Another feature that facilitates handling is the trailer hitch so designed that it can be used on small trucks or on trucks of 1½-ton, or greater. This is done by shifting the hitch plate from the bottom to



It's no trick at all to haul this Green's Fuel trailer to location.

the top of the tongue, or vice-versa, according to height of coupling on truck.

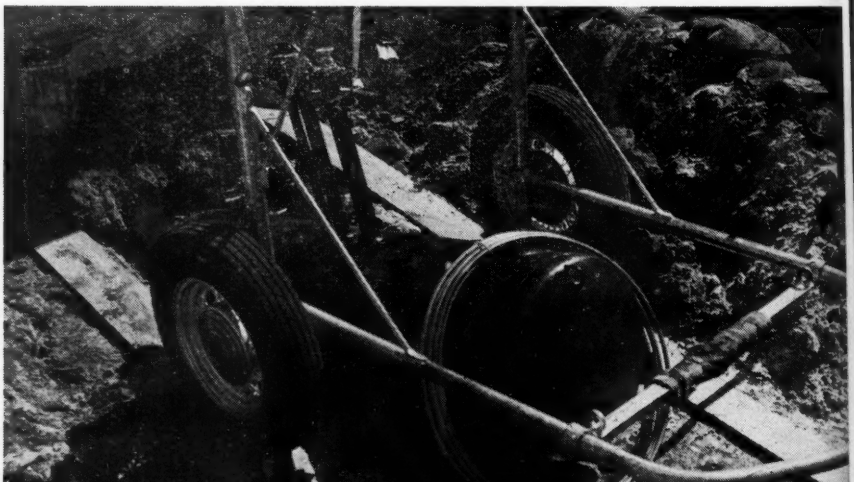
The trailer design calls for a small shelf whereon cement foundation blocks may be carried. This is directly in front of the wheels. One can be placed on each side so that better balance can be maintained.

•

The Fannin trailer is very similar to one designed and patented some years ago by Green's Fuel, Inc. Sarasota, Fla.

At Mr. Fannin's suggestion, Kenneth H. Koach, manager of Green's Fuel, was invited to send in pictures of the Florida model, and these are also reproduced herein.

Accompanying the photographs



A Green's Fuel Trailer in position for tank to be lowered for underground installation.

was this statement by Mr. Koach: "Basically, Mr. Fannin has the same idea that we developed, although he has applied his use of the trailer to his own type of operation which is 'bottled gas,' rather than underground systems.

"The trailer idea is not only novel, but it is very useful since it releases the use of a pickup truck for hauling appliances, etc., and at the same time it provides a means for hauling the underground tank or cylinder that will be installed on this one delivery. It also cuts down on manpower. We have found it most useful.

"At the present time we are negotiating with the Southern Gas & Equipment Co., of Tulsa, who contemplate taking over the manufacture and distribution of these trailers."

New C N G A Bulletin

LAST month the California Natural Gasoline Association issued its newly prepared Bulletin TS-441 "Tentative Specifications and Tentative Standard Methods of Test for Liquefied Petroleum Gases."

This bulletin was prepared for the use of manufacturers, marketers, and consumers who have occasion to gauge, blend, sample, specify or test LP-Gas products. It replaces the former Bulletin TS-392 which was published in 1939, and embodies new material and improvements in testing and gauging procedures developed since that time.

An entirely new set of tables of volume correction factors for converting observed volumes to volumes at 60° F. is included. This table is based on the latest available information concerning the variation of volumes with temperature of LP-Gas products. A new section has been added on the computation of vapor pressures.

A chart of "Corrected Vapor Pressures" permits more accurate prediction of the vapor pressure of LP-Gas mixtures than has hitherto been possible. A formula is given for use in blending LP-Gas stocks to produce a mixture of specified vapor pressure.

Methods are given for securing representative samples of LP-Gas from pipe lines or storage vessels.

Several new or improved methods of testing LP-Gas are presented. These include improved methods for determining vapor pressure and specific gravities. A new simple and rapid method for determining propane, isobutane, normal butane and isopentane is described.

An entirely new method for determining the water content of LP-Gas is also included. In addition to the foregoing, the bulletin contains specifications for the six standard CNGA grades of LPG.

Miscellaneous charts, tables, and figures are presented, including tables for correcting observed specific gravities to specific gravities at 60° F./60° F. A table of physical constants of light hydrocarbons and a vapor pressure correction chart for LP-Gas products is also presented.

John Locke Elected Director National Butane-Propane Assn.

John L. Locke, Northwestern Blaugas Co., St. Paul, has been elected as a director of the National Butane-Propane Association to represent the state of Minnesota, filling the unexpired term of Henry H. Henley.

Mr. Henley passed away Nov. 27.

Howard D. White Named LPGA Executive Vice President

ESTABLISHMENT of a national headquarters in Chicago and the hiring of two paid vice presidents to carry on Association work in an aggressive manner highlighted the two-day meeting held in St. Louis in mid-January by the executive committee of the Liquefied Petroleum Gas Association.

The Association voted to expand its entire program to bring to members more service and to engage in many additional activities during the coming year.

Howard D. White, an experienced trade association official, was hired as executive vice president. He will assume the routine administration of the association and was instructed immediately to undertake an aggressive campaign for new members.

Frank Fetherston Is Vice President

Franklin R. Fetherston, who has been associated with the liquefied petroleum gas industry for many years as secretary and treasurer of the association, was elevated to the post of vice president, technical division. Mr. Fetherston will retain his office in New York.

Mr. White will devote all his time to LPGA activities and has been given full authority to expand the staff to handle the work. An effort will be made to obtain space in a central area in Chicago which will be convenient to a members. "Your first respons bility will be to put into effect t expanded program authorized b the executive committee," Mr White was told by President Er nest D. Fannin. The committee ap proved this sentiment.

The committee also approved a expanded budget which will permi more expansion of association ac tivities. The activities and service which have been carried on in th past will be continued on an accel erated basis.

Membership Meeting This Spring

It was agreed that an annua meeting of the entire membership should be held in late April o early May of this year. No meetin of the entire membership has bee held during the war period. A com mittee was appointed to assist the new vice president in arranging this meeting. Named for this work are Charles O. Russell, Des Moines Ia., chairman; Budd G. Geroy, Chi cago; John Locke, St. Paul; E Carl Sorby, Rockford, Ill.; Vane W. Packard, Petoskey, Mich.; Ken neth R. D. Wolfe, Marshalltown Ia.; and H. Emerson Thomas Westfield, N. J.

Standing committee reports and suggestions were made to the group by Mercer G. Farrar, New York chairman of the committee on re vision of Pamphlet No. 58; Carl

Presidents and four vice presidents of the Liquified Petroleum Gas Association at the January St. Louis meeting of the Association's executive committee. Seated are Howard D. White, Chicago, the new executive vice president; President Ernest Fannin, Phoenix, Ariz.; and Franklin R. Fetherston, who was elevated to the position of vice president, technical division. Standing are Second Vice President Charles O. Russell, Des Moines, Ia., and First Vice President Harry K. Strickler, Erie, Pa.

Sorby, assisted by Mr. Thomas and Budd Mulloy, of the Selz Organization, on the promotional activities carried on by the publicity and advertising committee; Walter H. Hoagland, Marshalltown, Iowa, chairman of the technical and standards committee; and Frank B. Boice, New York, on the work of his legislative committee in developing model state and municipal regulations. Because of recent activity on the part of local and state law making bodies, the work of this committee has become increasingly important.

"There was a friendly cooperative feeling during the whole meeting," stated President Fannin afterwards. "On the first day we accomplished more than has been done in a good long time. Those attending the meeting dug in and worked toward the common good of the industry. There was give and take on all subjects. It was an expression of the democratic principles upon which the association was founded and upon which it is operated today.

"The next few years will mean a great deal to every man working in the liquefied petroleum gas industry and I think that the action taken at this meeting in St. Louis will go down in history as the most progressive step yet taken.

"The program of the industry is being geared to bring uniform benefits to all parts of the industry. The whole industry, every firm engaged in any aspect of liquefied petroleum gas work, should support the association. A more complete membership will mean availability of additional funds to expand the work even further."

PUMP PROBLEMS

Tank Truck Installations

By R. STANLEY SMITH

Manager, Smith Precision Products Co., South Pasadena, Calif.

THE suggestions made in this article will be found especially applicable to the small tank truck used for supplying butane or propane to the so-called "semi-bulk" plants of consumers having permanently located storage tanks. Deliveries of 50 to 500 gallons are usually made to these customers, and an accurate system of metering is important.

While it would be very difficult to show the many possible ways in which layouts could be developed for such installations, due to the great variety of equipment available, essential design features will be pointed out which will help to insure satisfactory operation and meet the average requirement.

It must be again emphasized that in pumping butane and propane, the fluid is being handled *at its boiling point,* which is far different from handling water or oil or even gasoline, which are comparatively stable fluids. The type of equipment and its installation must therefore be much more carefully considered if we are to secure maximum output and generally satisfactory operation.

In the first place, to get the best results it is necessary to avoid every possible condition tending to produce vapor in the pump supply line. Not only is it important that the pump be amply supplied with solid fluid, but also a continuous flow of new fresh liquid through the pump must be maintained, sufficient to carry away any heat which may be generated in the pumping process.

It is in part to bring about this result that a by-pass valve must be provided in the pump discharge line, and the capacity of this valve should be sufficient to return the entire pump output back to the tank without the development of excessive pressure, whenever other pump discharge valves may be closed. Also, when such regular discharge outlets are limited in their

BUTANE-PROPANE *News* **has, during the past year, been particularly active in expanding the supply of technical and non-technical engineering aid for the benefit of its readers.**

A new article contributed by R. Stanley Smith in the present issue is particularly directed to the problem of tank truck installations.

Mr. Smith is manager of Smith Precision Products Co., South Pasadena, Calif., which manufactures the Smith Butane-Propane Pump. He has devoted many years to the particular problems involved in handling butane and propane and is well qualified to write authoritatively on this subject.—Editor.

flow rate, as, for example, when filling only one or two small containers at a time, the by-pass valve must be relied on to return enough fluid to the tank to keep a continuous flow through the pump to carry off excess heat and avoid vaporization. This subject has been covered more completely in earlier articles, but its importance prompts the present repetition.

The sketches here presented illustrate an assembly of valves, standard fittings and other equipment which may be used for a successful, small truck installation, assuming a tank capacity of 1000 gallons, and a rotary pump rated at 50 GPM delivery, direct driven at 500 RPM by the truck power take-off.

Internal Valve Is Used

Fig. 1 shows a side view of the forward end of the truck tank, having a bottom tank outlet at (1) which is tapped 3-in. standard pipe size. While it is quite common to apply an excess flow check valve to this outlet, an internal valve (2) operated by a lever (3) is here shown. This valve has a 2-in. tapped outlet at the bottom to receive nipple (4) and a 2-in.x2½-in. reducing ell (5) into which a 2½-in. nipple (6) is screwed to receive 2½-in. line strainer (7). A flexible metallic pipe section (8) includes a union (9) connecting to the 2½-in. tapped inlet of the pump (10).

As has frequently been emphasized in previous articles on pump installation, it is quite essential that the pump inlet line be ample in size as well as short and direct. This is for the reason that butane or propane should be carried *into* the pump by gravity head alone, if a large portion of the pump capacity is not to be lost as is the case when the inlet pressure is reduced by suction, and quantities of vapor or foam replace the solid fluid entering the pump. Tests have shown that the type of internal valve illustrated affords a larger and more direct passage than that found in the usual excess flow valve.

Safety Feature Emphasized

In addition to this, it also avoids the necessity for adding an exterior shutoff valve at the tank outlet, since the one valve answers both requirements. The internal valve lever (3) is connected by rod or cable (not shown) so that the valve may be operated by a hand lever placed in the truck cab, and appropriate safety features may be incorporated to insure that this valve is always closed while the truck is on the road between delivery points. The fact that this valve is never opened except during the withdrawal of fluid, affords an excellent feature of safety protection.

The short 2-in. open nipple (4) offers no material area restriction, while the 2½-in. strainer suggested provides an advantageous increase in screen area over that found in the 2-in. size. The 2½-in. flexible tube (8) with union connection to the pump takes care of any weaving strain between the tank and the pump, which is a desirable feature. The end intake on the pump permits a direct flow and

positions the pump at a height so that a nearly straight universal drive to the truck power take-off is possible.

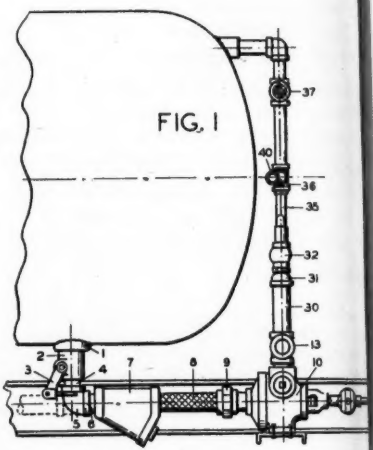
Looking across to Fig. 2, which shows an end view of the truck tank as seen from the truck cab, pump (10) is shown located just inside the truck frame (11) and is supported by crossbar (12) to which it is bolted. This pump is provided with three 2-in. tapped outlet ports, to permit piping to enter either side or vertically, whichever may be most convenient. In the present example, the vertical port only is used, the other two being closed by permanent pipe plugs.

The pump discharge is through the 2½-in. tee (13), union (14), tee (15) and then through pipe (16) running away from the observer and better shown in the truck side view, Fig. 3, as extending to an outlet valve (17). However, going back to Fig. 2, a second outlet through tee (15) passes through reduced ells (18) and (19), union (20) (see Fig. 3) and through meter inlet (21), meter strainer (22) and into meter (23).

Meter outlet (24) connects by nipple (25) to back pressure valve (26), nipple (27) and shutoff valve (28), which discharges through hose coupling (29) to a suitable flexible hose and fittings to customer's tank.

Unmetered Discharge Provided

All deliveries which must be metered pass through this meter line, just traced. However, when it is not necessary to meter the discharged fluid, it may be passed through line (16) and valve (17) previously indicated, which may be of larger size so as to permit faster discharge under less pressure restrictions. Also it should be pointed out that when discharging a considerable quantity of fuel through this unmetered line, it is usual to make a vapor return con-



nection from the receiving tank back to the truck tank. This will materially reduce the necessary pressure differential for the transfer, and thereby accelerate the flow.

Returning to Fig. 2, the tee connection (13) from the pump outlet is also provided with a pipe outlet (30) connecting through reducer (31) to spring-loaded by-pass valve (32). This valve will discharge through union (33), ell (34), nipple (35) into tee (36) and valve (37), back into the upper vapor filled portion of the truck tank. A vapor return hose line as suggested above is indicated by (38), connected to valve (39) and

line (40) back into tee (36). Valve (37) is left open at all times but is necessary to permit emergency shut-off in the event of pump or meter repair.

To complete the list of piping

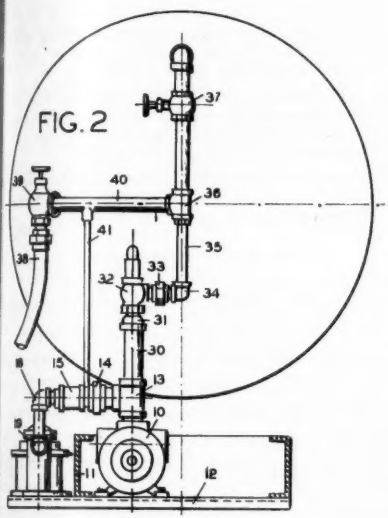


FIG. 2

and fittings, a copper tube line (41) connects between back-pressure valve (26) (Fig. 3) and some portion of vapor return line (40) below valve (37) as shown. The construction and operation of valve (26) and (32) will be more fully described later. Provision for filling the truck tank may be made by substituting a tee in place of the ell fitting (5) as is shown by dotted lines in Fig. 1, or a separate filling outlet may be provided especially for this purpose.

It should be particularly noted that the by-pass valve in this layout is placed at the highest point in the pump discharge line. This aids in the rapid elimination of any initial accumulation of gas in the pump or fittings. The by-pass valve shown is a simple form of spring-loaded check valve which is all-sufficient for this use.

However, a type must be selected which will be proof against "chattering" which so often becomes an annoying feature of such valves. In addition to other usual features, this valve has a very small hole (approximately ⅛-in. in diameter) drilled through the disc.

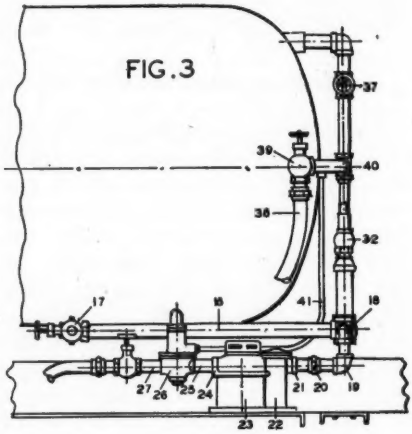
Preliminary Separation of Gas

This is an important variation from usual practice since it permits the continuous bleeding off of gas from the pump, meter, and adjoining lines, particularly while the tank is being filled, and prior to the operating of the pump. This tiny port also affords a continuous open by-pass during the pumping operation, but only to the extent of approximately a half gallon of liquid per minute, which is an insignificant part of the total pump output. However, in operation, as the tank nears the empty point, this small port is capable of passing a volume of gas or vapor nearly 100 times as great as its capacity for fluid. This rapid escape of vapor reduces the pressure on the outlet stream and so slows up the flow through the meter as to prevent the passage of vapor which would otherwise disturb meter accuracy.

When used in propane service, this method of gas elimination has proved to be quite a bit more effective than the usual type of eliminator tank with its more or less complicated float controlled valve

mechanism. However, its success is very much dependent on correct piping layout and the high positioning of this valve.

The back pressure valve (26) (Fig. 3) is usually of the diaphragm type, and is so arranged that until the pressure of the flow from the meter exceeds the tank vapor pressure by eight to ten



pounds, the valve remains closed and will not permit the passage of fluid. As soon as the pressure increases above this point, flow through the valve is no longer restricted.

There are several reasons, often not too well understood, why it is necessary to maintain this increased pressure within the meter. In the first place, if a volumetric, positive displacement meter is to measure definite volumes of liquid, the liquid to be measured must necessarily be solid and free from any possible gas content. Since liquid butane or propane will instantly start to boil with any slight increase in temperature or reduction of pressure over that in the storage tank, the only safe way of insuring solid fluid in the meter is

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In the January issue of BUTANE-PROPANE *News*, R. Stanley Smith's article dealt with "Unloading Tank Cars."

Through error, the two parts of Fig. 3 were incorrectly placed. The cuts on Pages 46 and 47 should have appeared in exactly opposite positions to those shown.

Readers preserving this series should make notation to this effect so that the drawings may be correctly interpreted.

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to maintain this increased pressure during the metering operation.

Also, when a differential pressure of eight to 10 pounds per square inch is maintained, this may be depended on to collapse any vapor which may have formed in or ahead of the meter prior to operating the pump. A further and often less appreciated advantage in holding such a differential pressure is that it creates a sufficient force to rapidly discharge any necessary large volume of gas back to the tank under conditions such as occur when the last fluid is being drawn from the tank by the pump.

Important Articles Will Follow

Many other important features of tank truck installation have been omitted in the present article for lack of space, but will be covered later in the necessary detail. In all layouts such as suggested above, proper mechanical protection against road hazards must be well considered and provided.

Butane Group Attacks Accident Problem In True Texas Style

WORKING on the assumption that safety is the keystone upon which the butane-propane industry must establish itself if it is to grow and prosper in the future, the Texas Butane Dealers Association held a meeting in Dallas, Dec. 21, for the purpose of working out a long-range safety program.

Not only were there dealers, fabricators, manufacturers' agents, and other representatives of the butane-propane industry present, but A. J. Bommer, representative of Underwriters Laboratories, Inc., G. M. Kintz, representative of the U. S. Bureau of Mines, Henry Herndon, safety engineer for the Texas Employers' Insurance Association, John Draper, safety director for the Texas Motor Transportation Association, and Robert A. Hicks, manager of the Dallas office of the Keystone Mutual Casualty Co., also were there and took an active part in the discussions.

W. E. FRALEY

W. J. LAWSON

Several specific recommendations came out of the meeting. The first and most important is that the butane industry conduct a series of educational and safety meetings throughout the state. It was decided to hold about 25 or 30 conferences at strategic points, so that persons interested in attending them would not have to drive more than 50 or 60 miles, at the most. It was also decided to hold them at night, so that drivers, service men, and office personnel could attend.

Representatives of the organiza-

Texas dealers, and those in other sections of the country, also, have sometimes found it difficult to obtain insurance coverage for their operations. This has been due primarily to publicity given a few dramatic accidents which have occurred in the past. Most of such accidents were concerned with transport operation and almost invariably were due to carelessness. The effect, however, has been to make it difficult to obtain coverage in many instances.

Texas dealers are not going to stand for this. First, they are going to campaign against the causes of accidents; next, they are going to keep a record of accident causes and accident frequency; then they are going to present these facts to casualty companies, well knowing that the record will be good.

They are especially concerned at this time about a large number of drivers, installation men, servicemen and others who are returning to the industry from military service or who are entirely new to handling liquefied petroleum gas.—Editor.

tions listed, along with other experts in the fields of safety, will conduct these meetings. They will be held as a service to the dealers and will be without cost to anyone. Since Mr. Bommer and Mr. Kintz already have engagements that will keep them busy through the month of February, in all probability the safety meetings will not begin before the first of March.

Another recommendation of the group was that the Railroad Commission be requested to take immediate steps to enlarge the personnel of the B-P Gas section of the Gas Utilities Division, so that violators of the rules and regulations of the Commission could be apprehended and brought into line without further delay.

Will Publish Safety Manuals

A third recommendation coming from the meeting, and which will be put into operation as quickly as possible, is that the Association should publish safety manuals. Two types were suggested—one to go to drivers, service men, etc., while the second one should be written so that dealers could present them to fuel users. The latter type would be strictly for the use and information of the housewife and rural user.

Because of the difficulties being experienced by a large percentage of the dealers of the state in getting adequate insurance, it was recommended that these safety meetings also deal with proper ways of bringing butane equipment up to insurance safety standards, so that insurance companies would accept them as risks.

Re-writing of that section of S. B. 269 dealing with insurance requirements was recommended. At the present time this section of the law is regarded as being vague and indefinite and insurance company representatives are not too sure how much protection a policy holder might have under it in case of an accident. Joint studies will be carried on between the Insurance Committee of the Association and representatives of the insurance industry, and with the advice and counsel of Underwriters Laboratories and the U. S. Bureau of Mines.

Before a plan can be offered to help prevent accidents, it is first necessary to find out what causes them. The meeting recommended that every possible step be taken to gather all the information possible on the cause of each accident where butane or butane equipment was involved, so that a remedy might be devised to prevent it from happening again. Dealers throughout the state are asked to report to the Association offices in Austin immediately upon the happening of an accident so that the Association will attempt an investigation and gather as much data as possible for use in trying to solve the accident problem.

Col. Homer Garrison, Director, Department of Public Safety, has already offered to assist the Association in reporting accidents involving the butane industry. The fire marshals in every town in Texas will also be importuned to assist. Any and all suggestions from the industry will be more than welcome.

Training Servicemen

Range Servicing

By C. C. WESTMORELAND

SURVEYS of the effectiveness of students in appliance servicing reveal that new men are more likely to leave mal-adjustments on ranges than on any other appliance. The same is true of experienced men but to a lesser degree. That fact may appear strange to the casual observer because range operation is relatively simple when compared to other types of appliances.

There are, however, several reasons why the range produces one of the more troublesome service problems.

1. The range gets more direct use and consequently more abuse from the customer than any other appliance. Most other appliances are used seasonably or operate automatically and require infrequent attention.

2. Poor housekeeping is reflected in the operation of the range to a larger extent than in other appliances.

Frequently dirt, cooking fats, and general neglect are responsible for a large percentage of service calls on ranges.

3. Another fact to consider is the greater number of burner pilots and valves found on ranges which require attention, offering the serviceman more chances to "miss" than on most appliances. Even the simple, old, high oven models contain five burners and valves as compared to the single burner and pilot usually found on other appliances.

In more modern models with multiple speed burners, automatic ignition, heat controls, automatic shut-off features and timing devices, it is easy to see how an appliance mechanic could fail to check an item needing attention.

Basic Training

The part of the basic training program devoted to ranges must

MANY NEW MEN are entering the liquefied petroleum gas industry. They will be dealing with a product, equipment and appliances which require specific knowledge. They, and men of experience, as well, can profit from information experts have accumulated. Average dealers are often handicapped by a lack of time and facilities in giving proper instruction to their servicemen and installers. Large organizations make this a regular department of their business. Good ways that some experts have learned to handle service problems are now being made available to readers of BUTANE-PROPANE *News* through a series of articles written by C. C. Westmoreland for natural gas utilities, large and small, and in their presentation here have been edited as to their applicability to the B-P Gas industry by Harold W. Wickstrom.—Editor.

C. C. WESTMORELAND

necessarily be designed to fill two requirements if it is to be effective. Obviously, the student should be equipped with the mechanical information necessary to correct improper adjustments. It is equally important that he should be encouraged to develop routines which will assure a reasonably complete survey of the points most likely to need attention.

Mechanical Information

Much of the "mechanics" section on this subject will be an extension of the points discussed under "General Principles of Gas Utilization" appearing in the December and January issues of *Butane-Propane News* with specific reference to their application in range servicing.

Burner adjustments, heat controls, automatic shut-off devices, and automatic ignition are typical items easily understood by new students who have received a sound foundation in fundamentals.

Top Burner Adjustments Easy

Top burner adjustments which will concentrate the heat under the utensil and oven burner adjustments which will result in even heat distribution are not difficult to teach because the student has learned the advantages of various types of gas flames.

Oven heat controls and automatic shut-off devices are not mysterious gadgets because rod and tube bi-metal and hydraulic elements have been explained. Specialized range accessories such as clocks and minute minders are new to the student and require specific attention.

Written material on this subject is easily obtained from a number of sources. Range manufacturers and manufacturers of accessories commonly used on ranges have service guides and other literature that may be obtained upon request. The American Gas Association range manual is a particularly helpful source of material. It is well organized and can appropriately be used as the "textbook" for this section of the course.

What's Needed for Training

Training props should include drawings, cut-away controls and accessories, manipulation boards containing operative sets of range accessories, and if possible, a few representative ranges. The number of complete ranges needed will be determined by the amount of field training scheduled to supplement the classroom training. Some provision must be made for the student to practice adjustments. If considerable supervised field training is conducted using the customers' equipment for practice purposes, the training equipment can be reduced proportionately.

Organizing the material into steps easy for the student to understand is important. In the early stages of training it is preferable to arrange the material on a "function" basis rather than on a "type of range" or trade name basis. The following outline taking up in sequence the cooking top, oven, and broiler is an example of

FIG. 1. JOB BREAKDOWN SHEET

Part: *Old or Outmoded Range.* Operation: *Check or Light-Up Trip.*

Important Steps	Key Points
1. Purge through top burners.	1. a. Hold lighted match over burners while purging. b. Light oven burner. (1) Through flash tube, if present.
2. Test for leak at range connection if range recently connected.	2. a. Use of match o.k. when zero registration is noted on meter spot test and connection is not adjacent to wall opening, or if system and house piping have had pressure test.
3. Make preliminary check. A. And/or adjust over burner while cold. B. Leave oven burner lighted with oven doors closed.	3. a. Remove pans, food, from oven. b. Check burner for correct air-gas mixture. (1) Should ignite readily through flash tube. c. Check input. (1) Flame should not impinge on oven bottom. d. Adjust if necessary. (1) Swab air mixer. (2) Ream plugged ports. (3) Adjust air shutter and input.
4. Check and/or adjust standby pilot, if present.	4. a. Check input and adjust if needed. b. Check location for proper ignition. Recheck if necessary.
5. Check and/or adjust broiler burner, if any.	5. a. Same as oven except sharp flame preferable.
6. Light and adjust top pilot.	6. a. If yellow flame pilot is used. (1) Adjust input. (2) Check location. b. If Rutz-type pilot, check input, vent opening and clean ports. c. If blue flame pilot: 1. Check for proper air-gas mixture. (a) If necessary, adjust for blue flame. (1) Blow out air mixer with tube. (2) Adjust air shutter. 2. Adjust input. (a) Increase input. (b) Tap pilot assembly to remove foreign particles. (c) Lower flame to proper height.

Fig 1. Job Breakdown Sheet—*(Cont.)*

7. Check and/or adjust top burners, griddle and simmers.	7. Execute the following operations as needed in the order given: a. Check for correct air-gas mixture. (1) Flame should be sharp but not blowing. (2) Griddle flame should be soft. b. Swab air mixer. c. Ream out plugged ports. d. Adjust air shutter. f. Check and/or adjust simmers as low as practical. (1) Simmer adjustments either in valve core under valve handle, or under sealed cap on side of valve, or as separate orifice on dual burner. g. If automatic lighting, check ignition from top pilot. (1) Be sure lighter slot or lighter port is clear.
8. Recheck oven burner while hot. Adjust if necessary.	8. a. Check minimum flame. Adjust if necessary. (1) Adjustment always found on body of control. b. If oven smothering. (1) Check vent for possible obstruction (steel wool, etc.) (2) Lower input to oven burner. (3) Increase primary air. (4) Check for oven burner or linings out of place. c. Recheck flame adjustment.
9. Clean-up and recheck top burner ignition.	9. a. Replace grates, pan and griddle. b. Check top burner ignition with aeration pans in place. c. If solid top, check that flames do not impinge or smother.
10. Check for missing or loose parts.	10. a. Order replacement or parts within scope of parts replacement policy.
11. Customer contact.	11. a. Explain any unusual condition. b. Answer any questions.

organization which has proven reasonably effective.

1. The Cooking Top

A. Top burner adjustments.
B. Top burner ignition.
  1. "Push-button" pilots.
  2. Automatic top burner ignition.
C. Multiple speed burner adjustments.

II. The Oven and Broiler

A. Oven and broiler burner adjustments.
B. Oven heat controls.
C. Minimum flame adjustments.
D. The "standby" pilot.
E. Automatic oven pilots.
F. Gas range clocks.
G. Minute minders.

As each sub-head is covered, the basic principle is reviewed to relate the new subject with knowledge already possessed by the student. The operation is then demonstrated, each step being explained as it is performed. The students, themselves, then repeat the same operation on demonstration equipment several times under the observation of an instructor. In this way the subject matter is

1. Related to something the student already knows,

2. Explained and demonstrated.

3. Consolidated into the students fund of knowledge by having him perform the operation.

Development of Routines

The development of an effective routine for checking the operation of various ranges should be encouraged as soon as possible in training. The establishment of work habits not consistent with company policy and good work may be avoided if the importance of proper job routines receives constant attention in training.

Refinement of methods is often considered the final step in a training program. That view is, to an extent, true because the separate steps cannot be combined into an overall routine until the individual operations are mastered. For that reason the bulk of the emphasis on routines must be deferred until the student is ready to combine several minor adjustments into a complete unit of work.

The value of correct sequence in the minor operations taught in the stages of training should not be overlooked. Even these minor operations consist of a series of short manipulations which can be arranged into an effective or ineffective routine.

It is possible, therefore, to inject methods at an early point in the students experience. It has been noted that simple operations, such as the adjustment of a single top burner, can be broken down into individual steps and combined into different patterns which vary in effectiveness. Specifically, the operation usually consists of three steps:

1. Cleaning the burner (mixer head and ports).

2. Adjusting the input.

3. Adjusting the air shutter. If the cleaning operation is performed last, the other two operations often must be repeated.

In addition to teaching the right way the first time, early emphasis on method starts the student to thinking in terms of sequence prior to the time when he will be asked to combine larger steps into major operations.

It is in the later stages of a sub-

FIG. 2. JOB BREAKDOWN SHEET

Part: *Oven*

Operation: *Preliminary Step in Calibration Procedure.*

Important Steps	Key Points
1. Get story from customer and make preliminary analysis for probable cause of complaint.	Customer's story often discloses cause of complaint. Go ahead with following steps while getting story.
2. If Automatic Shut-Off is present, check for operation and adjustment.	Do this first, before oven gets hot.
3. Check thermostat bulb or rod to be sure it is not touching oven lining.	1. Do this before the oven gets hot. 2. Check the oven for levelness. 3. Check oven door closure.
4. If a cold check point is marked on the dial, rough check calibration.	It is desirable to have the oven as near 350° as possible when calibrating. A cold check indicates the approximate calibration of the control, and can be used in setting the dial so the oven will reach about 350°.
5. Check and/or adjust oven maximum flame and standby pilot.	
6. Check for active thermostat. Verify rocking point, and that rocking point progresses as oven heats up.	If the thermostat bulb has lost its charge or the thermostat is otherwise inactive, time would be wasted trying to make hot calibration.
7. Check and/or adjust bypass flame.	Check on true minimum flame.
8. Analyze for other possible troubles besides mis-calibrations.	

Note: Hot calibration is not worthwhile attempting on bi-metal controls and certain old rod and tube controls. An offer to prop these controls open, so that the customer may utilize the oven manually, will be made; together with an explanation of what manual operation of the oven will entail.

If the above steps do not isolate the trouble, follow hot calibration procedure as outlined in Fig. 3.

ject where emphasis on routine "pays off" best because incorrect sequence at that point often requires the repetition of lengthy adjustments.

It is difficult in a "classroom" situation to develop a complete set of work routines applying to specific appliances but a general pattern can be established for groups

FIG. 3. JOB BREAK-DOWN SHEET

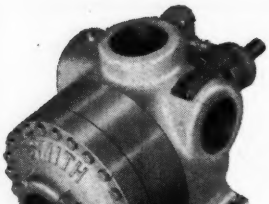
Part: *Oven*

Operation: *Hot Calibration Procedure* (Assuming Preliminary Checks and Adjustments are O. K.)

Important Steps	Key Points
1. Place thermometer in oven.	1. Use thermometer base, Armored thermometer lags 10° to 15° even after 20 minutes, if base is not used. 2. Center in oven. Turn so that it can be read with flashlight from crack of oven door.
2. Set dial so oven will heat to 350°.	1. On "CP" ranges, heating for 15 minutes will insure constant temperature if oven is near rated input. A second reading is not necessary. 2. Open oven door as little and as quickly as possible. Excessive opening may cause drop of 1° per second.
3. Take first reading of thermometer 5 minutes after flame ceases to reduce on liquid controls, or 10 minutes on rod and tube controls.	
4. Five minutes after first reading, take second reading. Repeat readings at five minute intervals.	On non-"CP" quality ranges, consecutive readings at five-minute intervals should agree within 5° to insure that constant temperature is attained. (Five-minute interval minimum.)
5. When constant temperature reached and dial varies more than 10° from thermometer, reset dial on shaft to correspond with thermometer reading.	1. Avoid moving shaft, this would change oven conditions and require waiting to reach constant temperature. 2. If shaft not moved and oven is between 300° and 400°, recheck at 350° not necessary. 3. If any doubt about movement of shaft, take check reading 5 min. later to see if thermometer and dial agree.
6. With dial and thermometer in agreement, offer to show customer thermometer reading.	1. This important step often convinces the customer and sells the job. 2. The customer probably can't read it very accurately, but will agree it reads what you say it did.

No Other Pump

CAN MATCH THEIR PERFORMANCE



Model T-3
Cap. 100 G.P.M.
at 500 R.P.M.

Model T-2
Cap. 50 G.P.M.
at 500 R.P.M.

Model 1044
Cap. 20 G.P.M.
at 500 R.P.M.

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of appliances. The job breakdown shown in Fig. 1 is an example of what can be done.

The work routines of students trained in this manner have been studied several months after their release. It was found that their job procedures were, in general, more uniform than older employes who had developed their own practices.

"Brushup" Training

The range, in common with other appliances, is an appropriate subject for "refresher" or "brushup" training designed to meet the needs of experienced service groups. Such training is usually conducted for one of several specific reasons:

1. To familiarize servicemen with new appliances or accessories.
2. To refresh the group's knowledge of appliances which require seasonal attention.
3. To correct a lack of uniform practices which are known to exist in the group.

Meetings designed to meet the first two objectives are rather common and conducted frequently in most companies. Steps taken to correct the third point, however, are not so common and are more difficult to organize and present effectively.

First, the weakness must be rather general in order to warrant the meetings. A detailed study of current practices is usually necessary to establish that point and to reveal the underlying reasons for lack of uniformity.

The preliminary investigation indicates which point or points are questionable. The next step is to crystallize an alternate procedure which is acceptable to all parties concerned. Several points must be taken into consideration before the new procedure is definitely accepted.

1. Is it consistent with the general company policy?
2. Can the new operation be performed in a reasonable period of time?
3. Will the end results be consistent with the standards of quality established for the type of work?
4. Are manufacturer's viewpoints included?

After the proposal has been thoroughly checked and approved, the project should be studied to determine the most practical medium for presentation to the service group. A series of meetings conducted to change a current practice is the most difficult type to present because old habits must be overcome before the new procedure can be introduced. Such meetings should definitely provide for the "students" to practice the operations under supervision. The application of the knowledge cannot be left to chance occurrence in the field.

The job breakdowns shown in Figs. 2 and 3, taken from the course outline conducted to correct oven calibration procedure, are examples of the detail necessary to assure even reasonable success in a meeting of that type.

The Tailor Needs Gas

THERE are approximately 55,000 tailor shops in the United States. Almost every one of these 55,000 shops makes an important part of its business the pressing of men's suits. Approximately 35,000 operate for this purpose with primitive equipment which consists of little more than a couple of heavy hand irons and an ironing board.

Practically all of them use a hand iron in one form or another, and it usually is nothing but a heavy duty edition of grandmother's so-called "sad iron." About 20,000 tailor shops already use some type of gas for heating such irons, and the remaining 35,000 are prospects for use of our fuel for the same purpose.

I do not write of the some 20,000 present users of gaseous fuels whose annual fuel consumption is approximately equivalent to 421,888 gallons of B-P Gases. Neither am I now particularly concerned with the 1,162,225 gallons per year of potential gas load which could be obtained by getting the remaining 35,000 tailors to heat grandmother's irons on hot plates.

I am thinking of the some 20,000 tailor shops which use heavy duty and modern pressing equipment, and which do at least 75% of the Nation's pressing business. Many of these 20,000 tailors do not have access to central steam plants, and are forced to depend upon small steam boilers in order to operate their presses.

Most of these boilers are in the 1-horsepower class, although you will occasionally find a tailor who uses a steam boiler of 3-horsepower capacity, or more. A 1-horsepower boiler which is used in clothes pressing service for but eight hours per day, 300 days in the year, can consume as much as 1200 gallons of B-P Gases. Twenty thousand such boilers can consume 24 millions of gallons per year. If you are pound-minded, this would be some 100,986,000 pounds of B-P Gases! It is truly a promising field of endeavor in which the guerdon is well worth our effort!

Many small B-P Gas operators, hide-bound in their conviction that B-P Gases belong solely in the domestic field of cookery, will be

By C. C. TURNER
Special Representative
Butane-Propane News

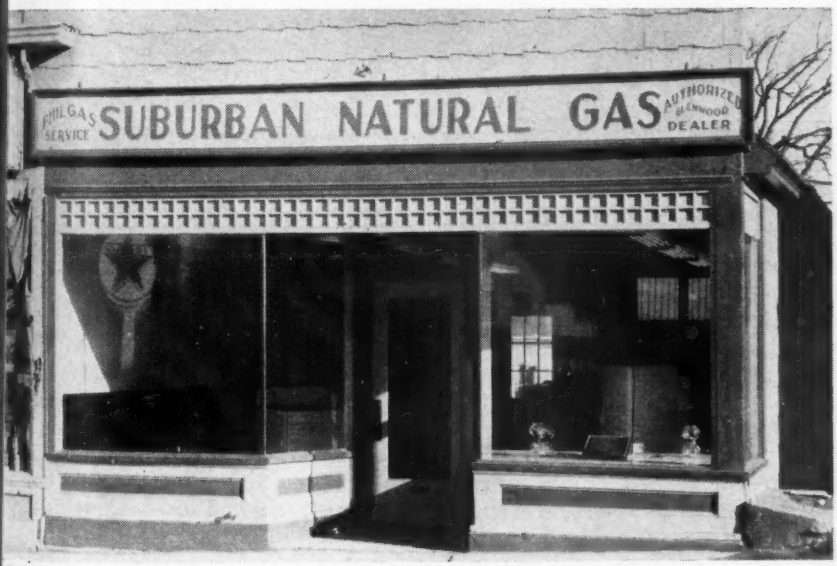
aghast at the thought of using these fuels to operate steam boilers. It will surprise them to learn that considerable progress has already been made in this application, and the sales resistance has not been as great as one might expect.

There are many reasons why liquefied fuel gases are peculiarly adapted to the needs of tailor shops. Many such shops are located in cramped quarters, or upon the second or third floor of a building. Not only is the storage of coal a problem in such instances, but also the handling of it.

Either a solid or liquid fuel requires larger flue capacities than are available in many buildings where tailor shops are located. Fly ash and coal soot do not improve the appearance of suits. A solid fuel requires frequent attention, and when an employe is shovelling coal or removing ashes he is not operating the steam presses. Hands must be washed every time after attending to the fire.

The care-free operation of an automatically controlled, gas-fired, steam boiler is not obtainable. Fires must be banked every night or a lot of time and fuel must be wasted each morning in building a new fire. Grates and linings must be frequently replaced. There is greater danger of fire with the solid fuels.

Fuel oil, while not having as many disadvantages, and being more amenable to automatic operation, has its handicaps, such



Home office of Suburban Natural Gas Co., Lebanon, N. H.

as storage space and equipment required, high first cost of burner equipment and controls. There is little, if any, difference in the chimney size required. There is an objectionable scum from fuel oil operation as well as an odor which garments readily absorb. Liquid fuels do not run as uniform in quality as do gaseous fuels, and when they are fed under pressure to a fire they require the use of fuel pumps which, in the course of time, do give trouble. The Btu content of B-P fuels may be somewhat more expensive than that of solid or liquid fuels, but when all items of expense are properly figured it is doubtful if the solid and liquid fuels are any cheaper, and they do lack many of the advantages of butane or propane gas.

Boilers May Be Had

Several reputable manufacturers, realizing the potential demand for small steam boilers, for some time have manufactured such units, which may be obtained at a nominal cost and complete in every respect.

Caution No. 1 to be observed: Be sure that when you purchase a steam boiler it conforms with the safety requirements in the state in which it is to be installed. The law in regard to constructional details varies considerably between the states.

Caution No. 2: Do not expect to save money by eliminating any safety feature. The difference in initial cost for a completely equipped boiler varies but slightly from that of a boiler which has been stripped of some of these sirable features, and economy compromising with safety sho not be considered at any pr Control features which should included are as follows:

1. A well designed and adequ safety relief valve of a type of c struction that permits it being tes from time to time.

2. A pressure control valve wh cuts down or shuts off the flow gas to the main burner when a p determined steam pressure is reach

3. A 100% safety pilot which c off the flow of gas to the main bur and also to the pilot in event of p extinguishment.

4. A low water cut-off which c off the flow of gas to the main bur and to the pilot in event of the wa level in the boiler becoming too l for safety.

5. A visible water gage of the gl tube type.

6. Try cocks to be used for testi the water level.

7. A good pressure gage for in cating the steam pressure in t boiler.

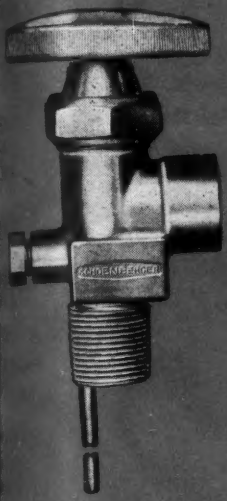
8. A good down draft diverter eliminate the possibility of burner e tinguishment by a back draft do the chimney.

An automatic feed water dev for maintaining the proper wa level in the boiler is also des able, although not strictly esse tial. The gas burner, dependi upon the design of the boiler, c be of the conventional atmosphe type providing that the fire box properly shaped to accommodate

You will not always be fortun enough to sell a complete new b er unit, and may be confronted

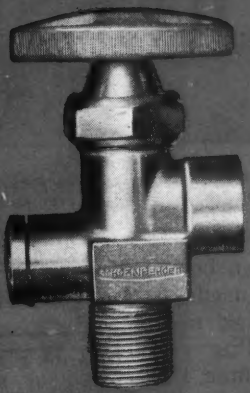
SCHOENBERGER

DIAPHRAGM PACKLESS CYLINDER VALVES



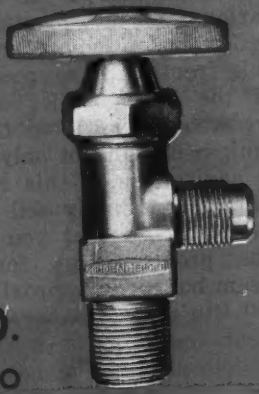
The new Schoenberger Valve contains an exclusive and most important feature — the *Pressure Equalizer*.

Fully protected by patents, the Pressure Equalizer eliminates any possibility of the lower stem sticking or "checking shut" under any operating condition. This automatic pressure release eliminates the need for a strong spring to open the valve against high pressure, thus a larger seat opening can be used. This means increased gas flow and faster cylinder charging.



Write for Bulletin P. B. 11

The rugged construction of the Schoenberger Valve assures long and satisfactory service. It is manufactured in a variety of types to meet the needs of producers and distributors of high pressure fuel gases.



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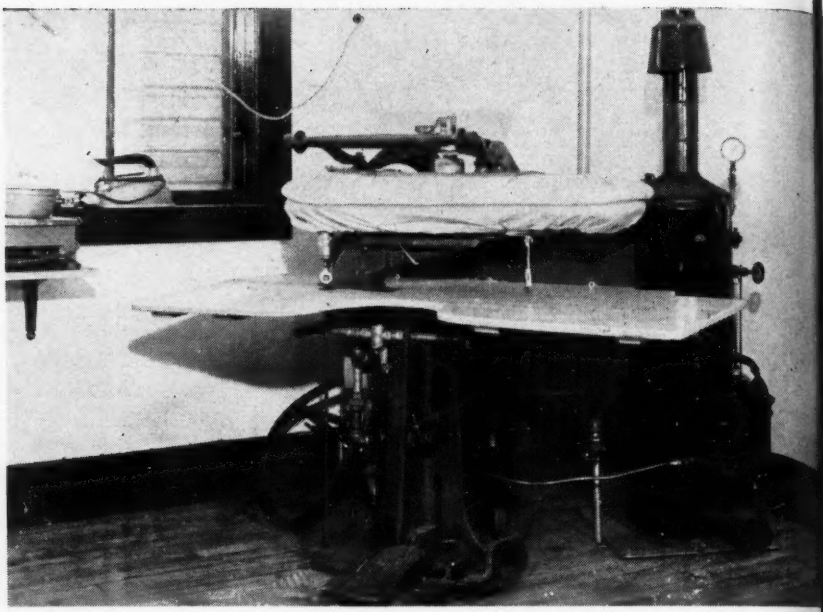

Small Hoffman press and boiler installed in a tailor shop. Mr. Berry says of it, "This is the most efficient machine I have ever seen in operation."

the problem of converting a boiler which has previously been used for coal or oil fuel. This task need not discourage you providing you install in the proper manner the various controls mentioned.

Conversion equipment is available from many sources, and most of the steam boiler manufacturers who specialize in this type of equipment will not only be pleased to advise you in this respect, but will also willingly sell you all of the materials that you may need. The proper input for gas-fired steam boilers is approximately 45,000 Btu per rated horsepower. In event that you have any trouble in determining the horsepower of the boiler which you are to convert, the dimensions in Table may be of assistance to you.

TABLE I. APPROXIMATE DIMENSIONS OF STEAM BOILERS PER HORSEPOWER

Ability to evaporate 34.5 lbs. of water per hour from and at 212°F. is here taken as being 1 horsepower.

Grate surface, per hp.	1/3 sq. ft.
Heating surface, per hp.	11½ sq. ft.
Water evaporated per hour, per sq. ft. of heating surface	3 lbs.
Solid combustible burned per hp. per hour	3 to 3.6 lbs.
Solid combustible burned per sq. ft. of grate surface per hour	9 to 10.8 lbs.
Water evaporated from and at 212° F. per lb. of combustible	9.6 to 11.5 lbs.
Ratio of heating surface to grate surface	as 34.5 is to 1

There will be variations fr

Good Looking!

GOOD COOKIN'

and if it's good cooking, it's 22 to 1 that it was done with

GAS
America's Preferred Cooking Fuel

•

And discriminating homemakers who want perfect cooking results—obtained with automatic ease and simplicity — will insist upon Cribbon & Sexton's famous

UNIVERSAL GAS RANGE
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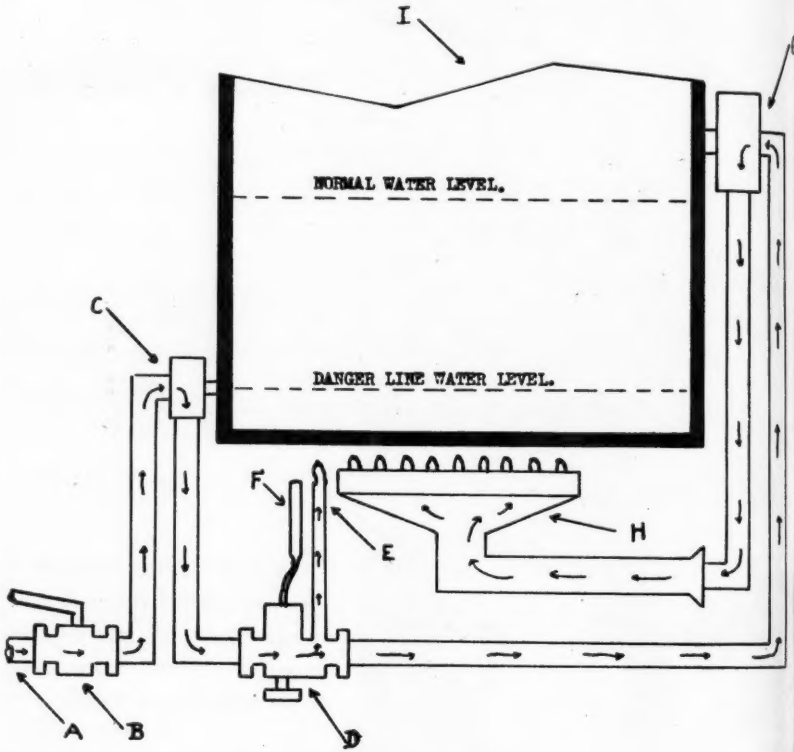
SCHEMATIC DRAWING SHOWING CORRECT ARRANGEMENT OF ESSENTIAL GAS CONTROLS USED ON A GAS-FIRED STEAM BOILER.



LEGEND. FIG. 1.

A = GAS SUPPLY PIPE.
B = MANUALLY OPERATED SHUT-OFF VALVE.
C = LOW WATER CUT-OFF VALVE.
D = MAGNETIC VALVE.*
E = PILOT BURNER.
F = THERMOCOUPLE UNIT.*
G = STEAM PRESSURE CUT-OFF VALVE.
H = MAIN GAS BURNER.
I = STEAM BOILER.

*A GOOD 100% SAFETY PILOT VALVE DEPENDING UPON THERMAL EXPANSION MAY BE USED INSTEAD OF A MAGNETIC VALVE AND THERMOCOUPLE UNIT.

ECONOMY SPHERES

A.S.M.E. Code constructed with standard approved fittings. Now available for storage and transport of either Butane, Butane-Propane mixtures, or Propane. Capacities of 150-250-430-1000 water gallons for above ground installations and truck mountings. Write for details.

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these dimensions, but they are sufficiently close to enable you to determine the horsepower of the average land type of steam boiler.

A schematic drawing of the arrangement of essential gas controls used in connection with gas-fired steam boilers is shown in Fig. 1. In this drawing, the gas connection to a B-P Gas system is at point A. Valve B is manually operated, and is used to prevent the flow of gas to either the pilot or main burner when it is desired to completely shut down the unit. Low water cut-off valve C becomes operative if the level of water in the boiler falls below the danger line. D is a magnetic valve which is energized by thermocouple unit F, which in turn only generates the current necessary to hold the magnetic valve in open position when pilot burner E heats it with a small flame. This valve cuts off the flow of gas to both the pilot and main burners when the pilot flame is extinguished. For the functioning of such valves see Chapter 11 in "The Bottled Gas Manual."

Valve Works Automatically

G is a steam pressure cut-off valve which shuts off the gas from the main burner only when pressure within the boiler reaches a predetermined level. It opens again when pressure within the boiler is reduced, usually at a point about 5 pounds below the closing pressure. H is a conventional burner of any type.

Just a word at this point in reference to steam pressure cut-off valves. Many of these are of the gradual action type with a by-pass around them to prevent complete extinguishment of the main gas burner when the valve closes. Such valves are fully as dependable and desirable as one which operates on the snap action principle, but some steam boiler manufacturers eliminate the 100% safety pilot when such a valve is used. I am decidedly not in favor of this practice. The input to a steam boiler burner is relatively large. If a 100% safety pilot is not used, there is nothing to prevent the escape of gas in large quantities from the main burner in event of a temporary interruption in the gas supply. Do not take this chance just to save a few dollars or to make a sale which may later be regretted if a safety pilot is not installed.

Big Business—Small Town

Up in the little town of Lebanon, N. H., which boasts of a population of some 7000 people, there is a "Philgas" distributor known as the Suburban Natural Gas Co., but those of us "in the know" will always think of him in more personal terms as being Ernest Berry, body and soul. During my years of association with our industry I have seen Ernest's business grow from a shoestring to over 700,000 pounds of B-P Gas delivered per year and, when appliances are available, he sells greater quantities than some of the so-called wholesale equipment houses, and every one of them at retail through his own sales organization.

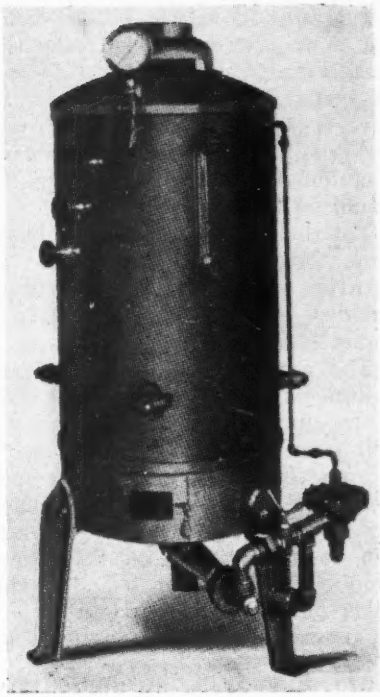
I believe that the first bottles

of gas were delivered from the back of Ernest's pleasure car. Now he uses five trucks, and is thinking of putting on more. If this had been accomplished in a territory which held a large population, one might think less of that 700,000 pounds and five trucks, but if you know your northern New England territory you will be forced to admit that Ernest's accomplishment has been unusual.

A business of 700,000 pounds per year is not to be had in a small community of 7000 people unless some huge industry within it is responsible for a large part of this consumption. Suburban Natural Gas Co. has not been so blessed, so it has expanded into the surrounding territory and it has taken advantage of every possible B-P Gas application, including the lowly tailor shop.

With his practical experience, Mr. Berry's opinion should carry weight. He considers a steam boiler, fired by B-P Gas, an excellent load builder, and an application which gives a minimum of trouble. The tailor shop picture shown in this article is but a small application among the shops in Suburban's territory, but its consumption averages 2 pounds per hour. Cost of a 4-cylinder, automatic installation for such a job would be about $76, including all labor and materials.

Let's do a little quick arithmetic. Two pounds of gas per hour, 8 hours per day, 300 days in the year, would amount to 4800 pounds and, assuming a net profit of 2 cents per pound, this would amount to $96, which is a return of 126% on the investment.



McKee Type D Eclipse steam boiler fired by B-P Gas. This is typical of the steam boilers used in tailor shops.

Now let us turn to a domestic, automatic installation with 2 cylinders, the cost of which, including labor and materials, would be about $46. Assume a yearly consumption of 300 pounds with a profit four times as great, or 8 cents per pound. The total profit on 300 pounds would be $24, or but 52% of the investment.

One hundred and twenty per cent profit in an industrial appli-

cation as against but 52% on a comparable domestic job! Let's put it another way. To make the same amount of money on domestic installations you would have to have four accounts instead of one, and your equipment investment, if automatic regulators were used, would be 2.42 times as much!

Yet there are those in this business, and to relate, that refuse to go after commercial and industrial business because the profit per pound of gas sold is less!

The application of small steam boilers is not confined to tailor shops, and in chapters to come we will learn more about them, with more attention given to facts and figures than herein. This chapter's purpose has been to awaken you to thought of uses for our products which we may find in the fields of steam and power.

H. H. Henley, Longtime Operator in Minnesota, Dies

H. H. Henley, who has been prominent in the liquefied petroleum gas industry since 1937, passed away in his home town of Tracy, Minn., last Nov. 27 of a heart ailment. He was 61 years old last June 23.

Mr. Henley's first venture in LP-Gas was organizing the Municipalities Gas Corp. and the Detroit Lakes Gas Co., building plants at Wahpeton, N. D., and Detroit Lakes, Minn.; then organizing the Wisconsin Rapids Gas Co. and building a plant at Wisconsin Rapids, Wis.

After disassociation with these companies he founded the Minngas Co. in 1937, with plant and headquarters at Tracy, Minn., serving the southwestern corner of Minnesota and part of South Dakota, later organizing the Dakota Minngas Co., with a plant at Aberdeen, South Dakota, to take care of the expanding Dakota business. He then took on the Bendix Co. of Wood Lake, Minn., which serves an area farther north in Minnesota tha that covered by the Minngas Co.

H. H. HENLEY

In September, 1944, Mr. Henley o ganized the Missouri Minngas C taking over the utility properties Brookfield and Kirksville, Mo., wi a view to rehabilitating and moder izing these systems, converting the to the distribution of undiluted pr pane.

Mr. Henley has occupied importa positions in the Liquefied Petroleu Gas Association and the National Bu tane-Propane Association.

The stockholders of Minngas C held their annual meeting in Jan ary, electing M. G. Ostgaard pres dent and director to succeed Mr. Hen ley. Mr. Ostgaard had been ver closely associated with Mr. Henley who had taught him many of th intricacies of the business.

Miss Anne M. Ostgaard is secre tary-treasurer of the company.

NBPA Directors Will Meet In Chicago Feb. 18-19

There is scheduled to be a meetin of the board of directors and th executive committee of the Nation Butane-Propane Association on Fe 18-19, according to Elwin E. Hadlic president of the organization.

The Bismarck Hotel in Chicago ha been chosen for the meeting.

TAKE THE *"inside track"* TO POST WAR PROFITS

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35 years of consistent radio, space and mail advertising—backed up by honest merchandising policies, forefront engineering and highest quality manufacture—have won widespread acceptance for DAY & NIGHT Water Heaters, America's finest. All models have specially-designed burners for LPG gases, require no adjustment, assure a perfect fuel mixture from the start. Equipped with Unitrol, the 100% safety pilot control; patented "Heat Trap" flue; Thermostat and many exclusive features.

Buyer surveys in state after state show a sweeping preference for DAY & NIGHT. In lush LPG markets of postwar years, this means top sales and profits for dealers of America's finest line of gas-heating equipment. Water heaters... wall heaters . . . panelrays . . . cabinet heaters . . . portable heaters. DAY & NIGHT offers postwar dealerships to qualified concerns serving the Butane-Propane field. Join the DAY & NIGHT parade to an unlimited postwar future. For the facts about a postwar dealership, write to . . .

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CURRENT READING

● Reviews of new books, pamphlets and articles published in recent magazines of interest to technicians and executives in the liquefied petroleum gas industry. Those interested in reading any complete article or book should write to the publications named.

●

Correlating Viscosity and Vapor Pressure of Liquids—D. F. Othmer and J. W. Conwell. "Industrial and Engineering Chemistry," Nov., 1945, pp. 1112-1115. Viscosity data may be plotted directly to give straight lines on log paper against a temperature scale readily calibrated from the vapor pressures of a reference substance. The method follows from that previously suggested for vapor pressures, vapor compositions, and other properties. A thermodynamic derivation indicates the soundness of the plot and of the governing equation, which is shown. The use of reduced temperatures correlates even better, since it tends to make the lines of all liquids converge in a narrow range at the extrapolated points corresponding to the critical. Fluidities, the reciprocal of viscosities, may be correlated by similar plots, either the temperature scale or against the reduced temperature scale obtained by this method.

Navy Experience with Diesel Fuels and Lubricants—Lt. Com. H. F. Galindo. "S.A.E. Journal," Nov., 1945, pp. 670-677. Engineering reports show that the following statements can be made about the performance of diesel fuels and lubricants used by the Navy under combat conditions: 1. Diesel fuel in accordance with Bureau of Ships Specification 7-0-2 (INT) is completely satisfactory if it is furnished free of contamination; 2. Heavy-duty diesel lubricating oil in accordance with Navy Department Specification 14-0-13 has given extremely satisfactory performance in all types of service in all combat theaters.

Tables for Measurement of Oil—Published July, 1945, by the Institute of Petroleum, London, England. This book of tables is the British counterpart, in Imperial units, and with certain additions, of the National Bureau of Standards Circular C410—National Standard Petroleum Oil Tables.

Peacetime Fuel Oils from War Equipment—A. E. Pew, Jr., J. B. Hill and J. R. Bates. "Petroleum Refiner," Nov., 1945, pp. 124-126. The purpose of this paper is to show the effect on fuel oil quality and supply of the operation of the catalytic cracking units built in the United States during the war. In particular, the resulting change in distillate fuel oil characteristics and its possible influence on domestic burner design are discussed. An A.P.I. paper.

Occurrence of Metastable States of Liquid and Vapor—R. F. Larson. "Industrial and Engineering Chemistry," Oct., 1945, pp. 1010-1016. A thermodynamic theory is advanced

Propane Storage Tanks For Bulk Plants

Southeastern Natural Gas Corporation distributes propane in Central and Southern Florida from six bulk plants having a total storage capacity of 160,000 gals., two-thirds of which we furnished.

Many distributors of LP gas depend on us for their storage tank facilities. We build propane tanks in standard capacities shown in the table at the right. They are designed and built according to Code requirements.

Whenever contemplating the installation of additional storage, write our nearest office for quotations. Please state number of tanks required, capacity, operating pressure and nearest shipping point.

STANDARD CYLINDRICAL TANKS
for the storage of Propane

Gross Capacity in Gallons of Water	Inside Diameter in Inches	Overall Length in Feet and Inches	Pressure** in Pounds per Square Inch
12,350	94"	35' 8"	200
15,150	94"	43' 6"	200
15,750	106"	35' 11½"	200
18,000*	94"	51' 4⅜"	200
19,300	106"	43' 8¾"	200
20,800	94"	59' 2½"	200
22,875	106"	51' 6"	200
23,650	94"	67' 1"	200
26,400	106"	59' 3¼"	200
30,000*	106"	67' ½"	200

* Most commonly used sizes.

** Designed in accordance with Par. U-69 of the ASME Code for Unfired Pressure Vessels. These sizes can also be supplied in API-ASME designs for 250 lbs. per sq. in.

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Cleveland, 15.....2271 Guildhall Bldg.
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Atlanta, 3.....2101 Healey Bldg.

Los Angeles, 14.....1468 Wm. Fox Bldg.
New York 6.....3451-165 Broadway Bldg.
Philadelphia, 3. 1655-1700 Walnut St. Bldg.
Washington, 4.....703 Atlantic Bldg.
Houston, 1.....5647 Clinton Drive
Detroit 26.....1559 Lafayette Bldg.

Plants at BIRMINGHAM, CHICAGO, and GREENVILLE, PENNSYLVANIA

for the requirement and mechanism of bubble formation in a heated liquid. Trial calculations using estimated thermodynamic properties of superheated water indicate that the nucleus bubble in the transformation state consists of a single molecule. The general theory is extended to condensing water vapor with similar results. The literature is reviewed for supporting evidence. The similarity between the supposed action of the ebullator and of a catalyst is pointed out.

The Determination of Metals in Lubricating Oils—L. Lykken, K. R. Fitzsimmons, S. A. Tibbets and G. Wyld. "Petroleum Refiner," Oct. 1945, pp. 132-142. Detailed procedures are given for the determination of lead, copper, cadmium, barium, tin, silica, zinc, iron, aluminum, calcium, magnesium and alkali metals in new or used lubricating oils without interference from other elements such as sulfur, phosphorous and chlorine.

Lead Response—Straight-Run and Natural Gasoline—W. L. Nelson. "Oil and Gas Journal," Oct. 6, 1945, pp. 106-108. A tabulation of the lead susceptibilities of straight-run and natural gasolines from various sources is given.

Two-Component Equilibrium Curves for Multicomponent Fractionation—F. J. Jenny and M. J. Cicalese. "Industrial and Engineering Chemistry, Oct., 1945, pp. 950-959. A new method of plotting equilibrium curves for multicomponent systems is based on the use of equilibrium values for the "light key component and lighter." This method simulates the McCabe-Thiele structure for two-component systems. It has been in use for over 5 years, and its application to the solution of industrial problems has been useful and time saving. Illustrative examples are included. The proposed method of applying the two-component structure presupposes that a complete solution is available for a specific problem and that another solution is desired in which conditions are not greatly changed from the original problem.

Factors Affecting Boiling in a Liquid—R. F. Larson. "Industrial and Engineering Chemistry," Oct., 1945, pp. 1004-1009. The phenomena of liquid superheat and of nucleate and film boiling in connection with heat transfer are reviewed. On the basis of wettability or interfacial free adhesion energy, a theory for the solid ebullator is evolved.

Postwar Internal-Combustion Engines and Their Fuels—T. B. Rendel. "S.A.E. Journal.," Nov., 1945, pp. 621-629, 647. Reviewed in this article is the field of internal-combustion engines and their fuel requirements, together with the field of refinery operations as they will exist for the next few years. The author also discusses some of the problems that both the engine and the petroleum industries will have to settle cooperatively, such as the still troublesome detonation and its exact measurement, preignition, and the interpretation of laboratory ratings of octane numbers in terms of actual road performance.

Lead Response—Cracked and Other Stocks—W. L. Nelson. "Oil and Gas Journal," Oct. 13, 1945, pp. 137-139. A tabulation of the lead susceptibilities of cracked gasoline, catalytically desulfurized gasoline, catalytic cracked gasoline, and aromatic stocks from various sources is given.

QUIZ — Thermostatic Control

• *This department is a monthly feature to stimulate thought and to give operators basic industry facts. Clip out for your notebook or file in a standard, 3-ring, loose-leaf binder. Sources of information: The Bottled Gas Manual, Handbook Butane-Propane Gases.*

Questions	Answers
1 **What is the function of a thermostatic control?**	The thermostat is used to control the temperature of water, air, ovens, vats, furnaces, etc.
2 **How does it work?**	The size of the gas flame is controlled by a valve in the gas inlet line to the burner. This valve is actuated by the thermostat to increase the flame size when the temperature drops, and to decrease it when the temperature rises.
3 **What are the most common types of thermostats used in the B-P Gas industry?**	Direct acting, electrically operated, and vapor tension types and thermocouple type.
4 **What are examples of direct acting thermostats and how do they work?**	Range oven temperature controller and automatic water heater thermostats. Both work on the principle that different metals have different coefficients of expansion. By selecting two pieces of metal having widely different coefficients of expansion and attaching them together on one end which is put into the oven or water heater tank, their relative lengths will change with a change in temperature. The gas valve is actuated by this change in length.
5 **What are examples of electrically operated thermostats and how do they work?**	Remote control types such as thermostats in living and bedrooms operating central furnace, air duct, temperature controls, etc. These thermostats take advantage of the same principle of difference in expansion, a bi-metallic element being used to actuate a switch which closes the circuit on a reduction of temperature which opens a solenoid type control valve in the gas line to the burner.

6

What are examples of vapor tension controls and how do they work?

This type is commonly found in process industries, commercial installations and places where very close temperature control is needed. A sensitive bulb is inserted in the medium to be controlled and the increase in temperature expands its contents, actuating a pilot valve, which in turn operates a regulator valve on the gas line to the burner. Usually a source of supply of compressed air is required to operate the pilot and the gas valve.

7

What is an example of a thermocouple type of thermostat and how does it work?

For control of high temperatures, such as temperature control of a galvanizing bath, or heat treating furnaces, a thermocouple is inserted into the medium to be controlled. The principle applied is that different metals have different electrical resistances as their temperatures change. Two dissimilar metal wires are attached at the end of the couple. As the temperature increases a slight flow of electricity is formed which, in turn, is used to actuate the control mechanism. In most cases the slight flow of electricity is amplified to actuate the control valve on the gas line.

8

Why is the thermostat so important to the B-P Gas industry?

The thermostat, regardless of the type used, is the heart of automatic heat control. Problems in heat control can be handled so simply with thermostats and B-P Gas that solid and liquid fuels and electricity are often put to considerable disadvantage, due to difficulty in control.

9

How can the B-P Gas man get better acquainted with the principles and details of controls?

"The Bottled Gas Manual" has good fundamental information on the subject. Manufacturers of different types of control equipment have informative and interesting catalogs on control equipment which should be obtained and studied.

10

What precautions should always be taken into consideration when recommending automatic control for B-P Gas installations?

Always insist upon the installation of 100% automatic pilot and main burner safety shut-off. The actual cost of this is very slightly in excess of inferior competitive equipment and protects the dealer, as most of the codes require it.

SUBJECTS TO BE COVERED IN FORTHCOMING ISSUES:

● Burner Design and Application ● Appliance Conversions

UP GOES the GAS LOAD

When Water Heater Supplies Electric Laundry and Dishwashing Machines

By G. M. ROHDE, Jr.
Ruud Manufacturing Co., Pittsburgh, Pa.

THE load building value of the automatic gas water heater, together with its excellent load factor, makes it an appliance very desirable to any gas dealer.

Every minute a hot water faucet is kept open, the gas load is increased by 3570 Btu, provided, of course, that the faucet is connected to an automatic gas water heater instead of another fuel. When one multiplies 3570 Btu by the number of minutes per day that the customer will keep the hot water faucets open if hot water is available at the right temperature and quantity, one can begin to see some interesting load-building possibilities.

Two electrical appliances are now on the market that will increase gas revenue from water heating if they are supplied with extra quantity of hot water at correct temperatures to make them operate at top efficiency. These electric appliances are (1) the automatic electric dishwasher and, (2) the automatic electric laundry machine.

The hot water requirements of these machines demand automatic water heating. These electric appliances open a new era that does more to obsolete the furnace coil, bucket-a-day, and oil coils, than everything done in the past. Let me quote from the service manual of an automatic electric laundry machine manufacturer:

"Auxiliary systems, such as furnace coils, solar or other indirect methods, are seasonal and otherwise frequently undependable and cannot be considered satisfactory."

Whether or not the gas industry will take advantage of this opportunity, depends upon the attitude taken regarding the hot water requirements of these electric machines. If the industry says, "Gas can't heat water that hot," "We've got a lime problem." "We've got a corrosion problem," then expect

EVERY MINUTE that a hot water faucet is kept open, the gas load is increased by 3570 Btu—if that faucet is connected to an automatic gas water heater. Two valuable allies of the gas industry in keeping those faucets open are electrical appliances — the automatic laundry machine and the automatic dishwasher. In this article, Mr. Rohde brings out a number of ways in which the gas industry and its salesmen can use these electrical allies to good advantage. The paper was presented before the Mid-West Gas Conference and School, Iowa State College, Ames, Iowa last fall.—Editor.

SOME THINGS LP-GAS MEN CAN DO TO CAPITALIZE ON THE VAST PROMOTION OF THE AUTOMATIC ELECTRIC LAUNDRY MACHINE AND AUTOMATIC ELECTRIC DISHWASHER.

1. Have a laundry machine and a dishwasher connected on the sales floor with an automatic gas water heater of sufficient capacity. This should be a real live demonstration, set up with meters and thermometers, to show people how hot the water should be and how much is needed.

2. Call on all automatic electric laundry machine and dishwasher dealers in your territory and have a plan whereby you will service the gas water heaters where they install these appliances in order that the customer can get the correct water temperature, etc.

3. Explain and demonstrate how improper piping affects the washing efficiency of the machines.

4. Make your sales room the headquarters where anyone can come to get all of the real, unbiased truth on hot water requirements for these machines.

If you do these things you will render a service to your customers and increase your gas load.

the hot water solution to the hot water requirements of these electric appliances to come in the form of electric water heaters or oil automatics.

The lime problem need no longer be a handicap to anyone wanting higher water temperatures. Hexametaphosphate, commercially, known as "Micromet," is one way to solve the lime problem. Purdue University Bulletin No. 74, "Scale Formation In Water Heaters and Methods of Prevention," is one that every gas man should get because it is the most complete study of lime and its effect on gas water heaters, ever published.

On the subject of corrosion, manufacturers will have available heaters built to withstand the corrosive action of hot water at temperatures required for these automatic electric appliances.

Laundry Research

The public clamor for this machine and the lack of information on correct water temperature for washing clothes, has caused tw outstanding colleges in the count to undertake studies on the subje of washing. Virginia Polytechn Institute has just completed i project, and Penn State Colleg under the direction of Dr. Paulin Berry Mack, is conducting the mo comprehensive study of washi ever undertaken. Penn State h been working with commerci laundry associations and it is w qualified to make a study of thi kind.

Speaking of laundrying of co tons and linens, such as bed sheet pillow cases, white shirts, wo shirts, towels, handkerchiefs, or other words, the bulk of the wa Virginia Polytechnic Institute re port shows that, regardless of th type or make of machine teste "The hotter the water, the whit the wash." This may startle som but, of course, we're not talkin about the dainties washed in th bathroom. Many washer people w be out, as well as soap people, sa ing that their machine or so

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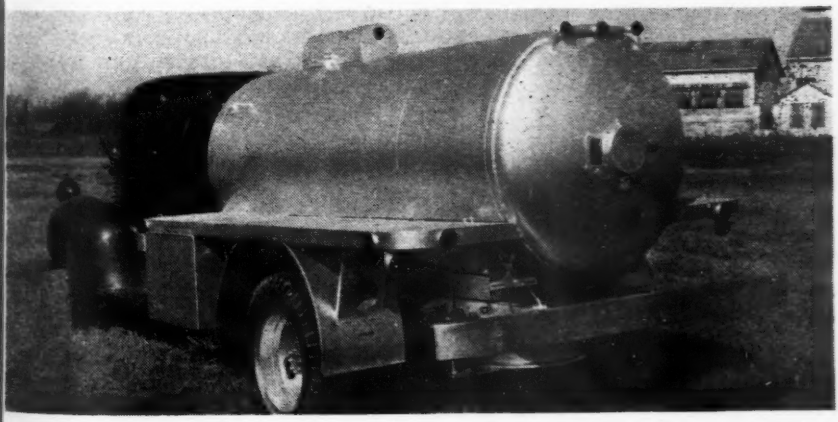


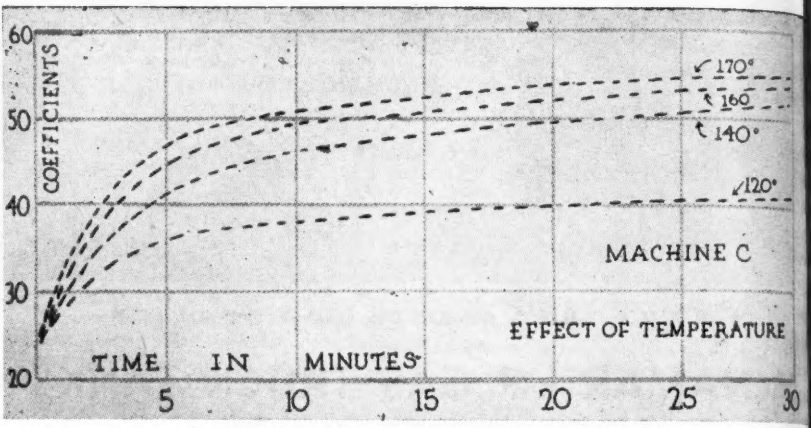


Chart taken from Virginia Polytechnic Institute's report which shows that "the hotter the water, the whiter the wash."

saves hot water. Hot water cannot be saved without sacrificing cleanliness.

Some automatic machines have the advantage of being able to use hot enough water to simulate commercial laundry procedures and in so doing, according to Pennsylvania State College Bulletin No. 4, make the clothes free from pathogenic bacteria. Soapy water of 110° and 120°, according to this bulletin, does not accomplish this.

Conventional type washer manufacturers advertise the fact that water can be used over and over again, whereas a sanitary feature of the automatic machine is that fresh, clean, hot water is used with each batch of clothes. Many clothes dried by centrifugal force in the automatic laundry machine, need not be ironed. A recent survey shows that 47% of the homes surveyed in Western Pennsylvania, boiled their clothes before placing them in the conventional washe
So-called saving of hot water is e
pensive according to results fr
Virginia Polytechnic Institut
which says that:

Increasing the water temperatu
alone, 40° *extra*, produced 26% ex
whiteness for less than 1.4c ex
for gas.

Leaving the water temperatu
alone at 120°, but adding 50 gra
of extra soap (F-5) gave 25% ex
whiteness for 3.2c extra cost of so
Gas cost less than half to accompli
what the soap did.

When you sell them extra h
water *you* get a *load*. When th
substitute extra soap for h
water, *soap* companies get the *loa*

Part Hot Water Plays

A recent survey made by a lar
Eastern electric company on t
users of automatic laundry m
chines in their territory, sho
how much a part hot water pla

the success of the automatic laundry machine. This electric company has 5232 automatic washers on its lines, 88% of them in use for at least three years. Twenty-two different water companies serve different sections of the territory and each has a different water analysis. One company has an average hardness of 304 parts per million, which is extremely hard. Another has water that contains as little as 45 parts per million, which is less than three grains of hardness.

Of these laundry machine users 55.8% had instantaneous gas water heaters, 35.3% had automatic gas storage water heaters and 18.9% had side-arm gas water heaters. To quote from the electric company's report:

"The most significant fact brought out by these averages is that in one-half of the loads, the starting temperature of hot water was below 140°. Compare this with the fact that 62.5° of the dial settings called for a water temperature of 140° or more in the automatic washer."

"In comparing the 'starting' water temperature of these loads with the average of all loads, we discover a significant difference. Definitely lower temperatures existed throughout the unsatisfactory loads."

To correct the trouble, 6.3% of home-owners installed new automatic gas water heaters.

4.2% set up thermostat.

2.2% made repairs and adjustment.

4.0% waited longer between loads.

3.6% washed on different days.

2.2% turned up the gas.

3.2% pre-boiled the clothes.

In homes where very hot water was found (over 150°), the housewives were questioned:

"In 24% of the homes covered, temperatures over 150° were found. (3% had temperatures 170° and up)."

"In over 80% of these cases, housewives were not perturbed, nor were they aware of any particular difficulty experienced by other members of the family with the hot water. About 12% recalled that they had to be careful when they first used the heater."

"The remaining 8% included a few who wanted the water temperature definitely reduced because they, or other members of the family, did not like it. However, in this group, it seemed mainly a matter of comfort rather than fear."

Lapse of Time Between Loads

"The hot water supply is affected by repeated and speedy succession of washes. The more quickly one load follows another, the higher must be the recovery rate of the water heating equipment."

"Details for the time between the first and second loads, are as follows: 40.3% of the second load was started in 15 minutes, or less, after the first load."

"In half the loads reported in this study, the recovery rate appears to be inadequate. In fact, the low hot water temperatures that prevail by the end of the wash period in half of these loads (125° and down), shows that the hot water supply is not generally hot enough *to meet the known requirements of the automatic machine.*"

"Paradoxical as it may seem, this survey indicates that ordinary water heating equipment will serve, if the

customer is willing to sacrifice speed and convenience and wait a sufficient length of time to obtain high water temperatures."

General Recommendations

1. "Salesmen who sell water heaters can render a better service to customers if they recommend new heaters of sufficient capacity to take care of the demands of automatic washers, as has been indicated in this study."

2. "Architects' and Builders' codes should specify large enough water heater capacity to take care of the hot water demands of automatic washing machines. Specifications based upon average demands are important for proper utilization of automatic washing machines."

Emphasis has been placed on the laundry machine, but the automatic electric dishwasher has a simi story. Many pre-fabricated build will make the automatic laundry chine and automatic dishwasher standard part of their homes.

In World War I, faulty dishwa ing caused widespread outbreaks disease. In this war the milit profited by that experience and, a result, no outbreaks were repor where there was adequate hot wa of the correct temperature to w dishes according to army regulati The army had to clean up resta rants adjacent to army camps in der to prevent civilians from infe ing the camp. The automatic di washer is one appliance that fa flat on its face on performance w the water temperature goes down.

The gas industry can see all th opportunities. It has all the fa Now how can the industry keep th faucets open more minutes per da

Automatic Laundry Machine Facts

1. Cycle can be from 21 minutes to 47 minutes.
2. Cycle uses 15 gal. of hot water.
3. Three loads can be washed in 1 hr., 6 min., using 45 gal. of 160° F. water.
4. Temperature settings are as follows:
   a. Cool—60-85° F.
   b. Colors—105-115° F.
   c. Silks—115-125° F.
   d. Cotton—135-145° F.
   e. Hot—155-165° F.
5. Seven and nine pounds of clothes per load (average family 21 lbs. per week).
6. Temperature drop in machine:
   15° F. on dry load.
   30° F. on pre-soaked loads.
   12° drop in conventional washer (110).
   31° drop in conventional washer (185).
7. Cold water slugs due to piping, (Purdue) 25% heat loss.
   37 ft. of ¾ in. pipe requires 7¾ qts. of cold water drained off before hot water is available (Copper & Brass Research).

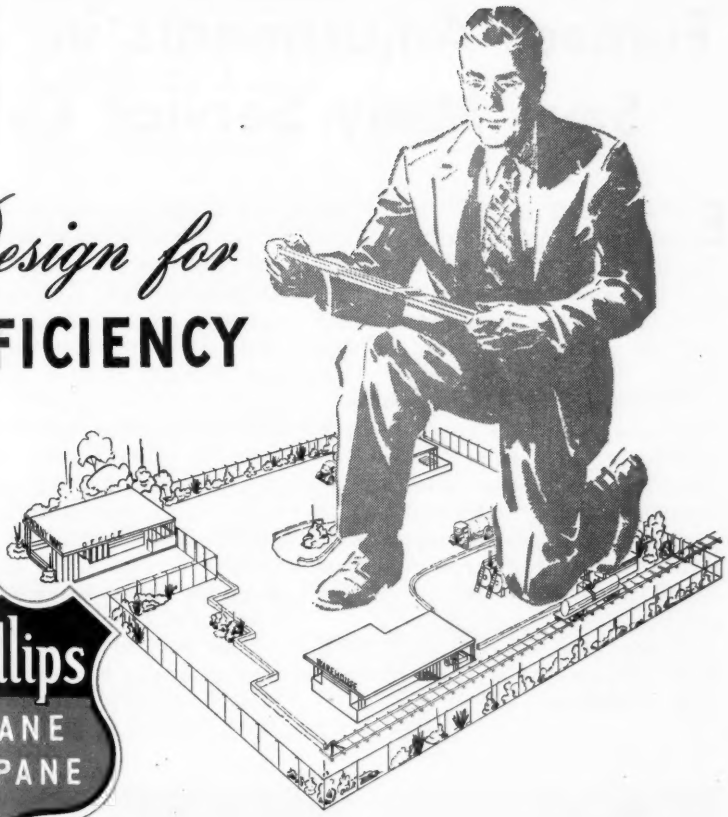
Standard of Calif. Assigns John Licata to Marketing De

John Licata, who has had 17 ye experience in petroleum sales, been appointed manager of the s cial products division of Standard of California's marketing department, it is announced by H. R. Cuyler, manager of the oil company's product sales. His headquarters will be at the San Francisco office of the company.

JOHN LICAT

Mr. Licata, formerly a sales specialist at the company's San Fr cisco headquarters, will have ch of marketing liquefied petroleum

Design for EFFICIENCY



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THE WORLD'S LARGEST MARKETER OF LIQUEFIED PETROLEUM GAS

Furnace Adjustments in Shop Save Many Service Calls

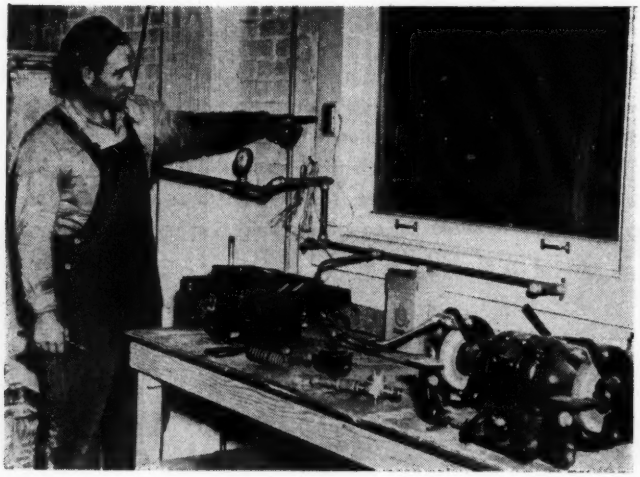
EXTRA costs in the way of adjustments and lengthy control repairs on thermostatically-operated butane floor furnaces are eliminated by a novel test bench built by Berg & Strain, Fresno, Calif.

The Berg & Strain organization, originally a plumbing and heating dealership, has gone wholeheartedly into appliance retailing in Fresno, including sales and service on butane and propane appliances, repair service, and large industrial installations of butane or natural gas heat.

In the retail side of the picture, floor furnaces have been particularly important.

A large percentage of floor fu nace installations made by th company were of the thermostati cally-controlled, automatic pil variety. "We specialized in therm stat types because the automati heat feature fitted in well with ou postwar plans" Henry Berg, par ner in the firm, explained. "How ever, it often occurs that adjus ments are necessary. If we wa until after installation, they ar harder to make and it mean special service calls, all at addi expense. So we decided to do som thing about it."

The result is Berg & Strain test bench in the service shop, o which all automatically-controlle



Test bench at Berg Strain's, Fresn Calif., shop che furnace controls b fore deliveri to eliminate servi calls. Note thermo on wall.

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offer

....all the 'extra' cooking features

....all the 'wanted' consumer appeal

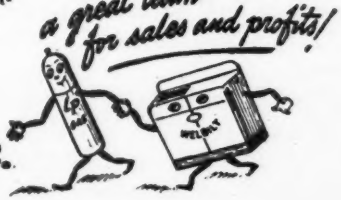
....*plus* the high standards for EFFICIENT L.P.G. PERFORMANCE

A SIZE TO FIT EVERY KITCHEN OF TOMORROW

The World's Biggest Selling Popular Priced Ranges

There are many good reasons for this.

1. **5 cooking features women demand as a 'must' in postwar surveys.**
2. **Minimum servicing means that your customers can expect consistent daily service.**
3. **Nationally advertised.**



L. P. G. DIVISION

WELBILT STOVE CO. INC.

MASPETH, L. I., N. Y.

floor furnaces must be thoroughly tested before delivery to the home.

This consists of a five-foot wooden bench at waist height, on which floor furnaces are set. To the right, a 30-gallon B-P Gas cylinder is mounted in wall brackets, and connected to a ½-inch pipe which runs the length of the bench. The pipe has two valve-controlled outlets to which the floor furnace can be connected. On the left is a natural gas connection of the same type, piped in from the shop gas lines.

On the wall above is mounted a standard thermostat control with electrical connections ending in clip-on alligator clamps quickly fastened to the floor furnaces electrical leads.

Shop Inspection Comes First

Floor furnaces as sold are now automatically relayed to the shop before delivery, where the mechanic on duty puts each through a four-hour test before okaying it for home installation. The thermostat is set at various temperatures and checked for faithful delivery of each during this period, utilizing either natural gas or butane according to its ultimate destination. Such elements as the self-actuating pilot light, valves, and auxiliary controls are also checked, and each final adjustment made before the floor furnace can be released.

"We saved the entire cost of this test bench in a few months,' Mr. Berg said. "Inasmuch as it completely eliminated non-profit service calls and adjustment We're going to apply the same id to automatic water heaters a other butane appliances as soon we can get the materials to set other tes facilities."

All parts of the test bench e cept for the B-P Gas tank and t thermostat control were made o of scrap material in the Berg Strain shop.

Ivan W. Patterson Made Sale Manager of General Gas Cor

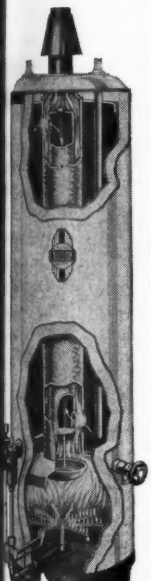
Hal Phillips, president and gene manager of the General Gas Cor Baton Rouge, La., announces t appointment Ivan W. Patt son as gene sales manag for the corpor tion effective Ja Dec. 1. Mr. Pa terson will be charge of sa of a comple line of applianc in the company 20 branch offi and displa rooms throug out the states Louisiana and Mississippi.

I. W. PATTERSON

For the past three years Mr. Pa terson has served as Assistant C lector of Revenue for the State Louisiana, resigning to join the st of the General Gas Corp. He al served as an executive assistant Governor Sam H. Jones in 1940 a later as Chief of the Motor Vehi Division of the Department of Re nue. Prior to entering the stat service he spent eight years in t appliance and advertising field southwest Louisiana.

MISSION ENGINEERED

More Hot Water Per Minute *At Less Cost*



The inner tank circulation feature★ of Mission Senior exposes over double the normal tank area to heat absorption. Ordinary heaters offer but 3½ sq. ft. of heating surface to direct heat action.

But with Mission Senior the full effect of the Bunsen Burner heat is absorbed by 8¼ sq. ft. of metal in direct contact with water (the combined surface area of the inner and outer tanks exposed to direct heat).

This plus value of 5 extra sq. ft. of heating surface in Mission Senior operates to the user's advantage every minute burner is on.

★*An exclusive feature with Mission Water Heaters.*

Especially designed for Liquefied Petroleum Gases

Mission Appliance Corporation
MISSION WATER HEATER CORPORATION
Headquarters PLANT: 7101 McKinley Avenue, Los Angeles, California

New Products

Manifold

The Bastian-Blessing Co., 4201 Peterson Ave., Chicago 30.

Model: Rego No. 2523

Description: Automatically accomplishes the change from the service to the reserve cylinder when the service side in exhausted, providing uninterrupted gas service. Actuated by a cam and lever instead of by shift bar, its operation is unaffected by accumulation of dirt or grit on the manifold or by weather conditions.

Design of seat and valve stem and large diaphragm area permit compensations for varying cylinder pressures, thus closely regulating pressures and position of indicating gage needle.

Standard setting is 12 lbs. pressure on service side and 6 lbs. pressure on reserve side. Connections of standard POL type, interchangeable with other manifolds now in service.

Tube Fitting

"Flexigrip" time-saving tubing tings which eliminate end prepara or soldering of the tubing and produce a stronger, leakproof flexible joint have been announced Gustin-Bacon Manufacturing Co., Kansas City, Mo.

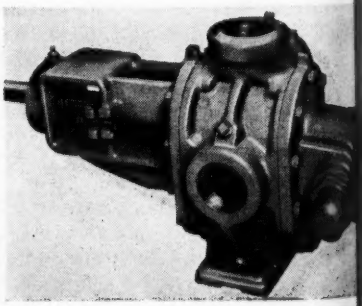
The "Flexigrip" fitting, made standard sizes from ⅛-in. to 1¼ O.D., consists of four parts—the bo a gripping ring, synthetic rubber g ket and nut. To attach the fitting, nut (with gasket and ring inside) slipped over any plain-end tube, to desired length. The tubing en inserted into the body as far a will go and the nut tightened. Tig ening the nut compresses the r into a tight grip and moulds the g ket around the ring for a leak-p seal that is so flexible it will w stand unusual vibration or impu

Flexigrip tubing fittings are av able in brass, aluminum or steel.

LP-Gas Pump

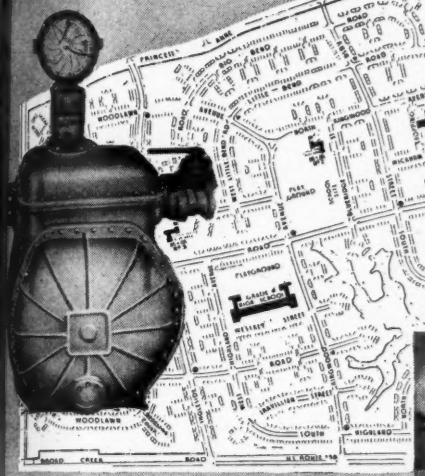
Geo. D. Roper Corp., Rockford,

Description: New precision repla able bearing with extra high load pacity; deep packing box contain 10 pre-formed split-ring packi permitting lower radial pressure; reduce wear, equal sized semi-s



MASTER-METERING

Through 30 miles of mains



Broad Creek Village, developed and managed by the FPHA, will shelter more than 3000 families of Government employees or those engaged in essential war industries. Modern Gas Company, Inc. installed the LP-Gas system and provides the service.

At the Broad Creek Village housing project in Norfolk County, Virginia, domestic LP-Gas is distributed over an area of 1¼ x ¾ miles at approximately 10 lbs. per sq. in. pressure.

Accuracy of the over-all gas measurement is essential to the proper maintenance of total cost-control figures. The ability of the key meter to take care of itself without pampering is another important factor in its selection.

This master meter—housed in the control building—is the Metric-American 500-B Ironcase LP-Gas Meter, equipped with Base Pressure Index and Volume and Pressure Gage. A Reliance-American H.P.C. governor also is employed in flow control.

* * *

The several types of Metric-American Ironcase Meters, a "heavy-duty" line adapted to handling various different gases, are covered in our Catalog EG-40. Meters of all sizes and pressures.

3053

METRIC METAL WORKS • ERIE, PENNSYLVANIA

AMERICAN METER COMPANY

INCORPORATED ESTABLISHED 1836

pumping gears are keyed to shaft; new lubricating and cooling principle causes small volumes of liquid to by-pass hydraulically through grooves in each of 4 high-lead bronze bearings; full diameter stainless steel drive shaft—heat treated and hardened, non corrosive; cap and split-type packing gland, quick and easy to remove, allowing additional clearance for re-packing; built-in relief valve giving added protection.

Engineered as a direct-drive unit to operate at idling speeds through a transmission power take-off. Can be chain and sprocket driven where truck construction does not permit direct-drive connection.

For bulk station service, single or multiple units with gear reduction drive can be furnished in various sizes mounted on individual bed plates. This pump is interchangeable with all Roper tank truck pumps.

Self-Locking Joint

Norton - McMurray Manufacturing Co., 39 S. LaSalle St., Chicago 3.

Model: Normac Self-Locking Joint.

Application: The purpose in designing this joint was to accomplish what has never been achieved before by the standard type of coupling joint, or "slip-coupling" as it is often called.

Description: In this joint have been incorporated practically all the advantages of other similar types, including ease of installation, lack of need for special preparation of pipe ends, and opportunity of angular deflection.

Added to this is the unusual feature of locking the pipe in the joint so that it can be laid on top of the ground or any exposed area without anchorage. This locking is performed by the spring type lock ring (small-diameter copper or steel spring ring) which is inserted against the gasket at each end of the coupling. As the gland ends of the coupling are tightened, the lock ring is compressed with a wedging action so as to lock the pipe end and the gland together with a metal-to-metal grip. This assembly is shown in Figs. 1 and 2.

The self-locking joint has withstood an internal pressure of 1800 psi without anchorage. This copper spring ring also serves the additional pur-

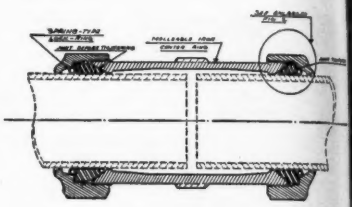


FIG. 1
NORMAC SELF-LOCKING COUPLING

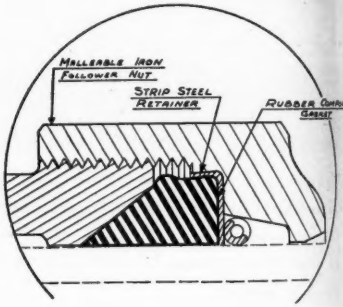
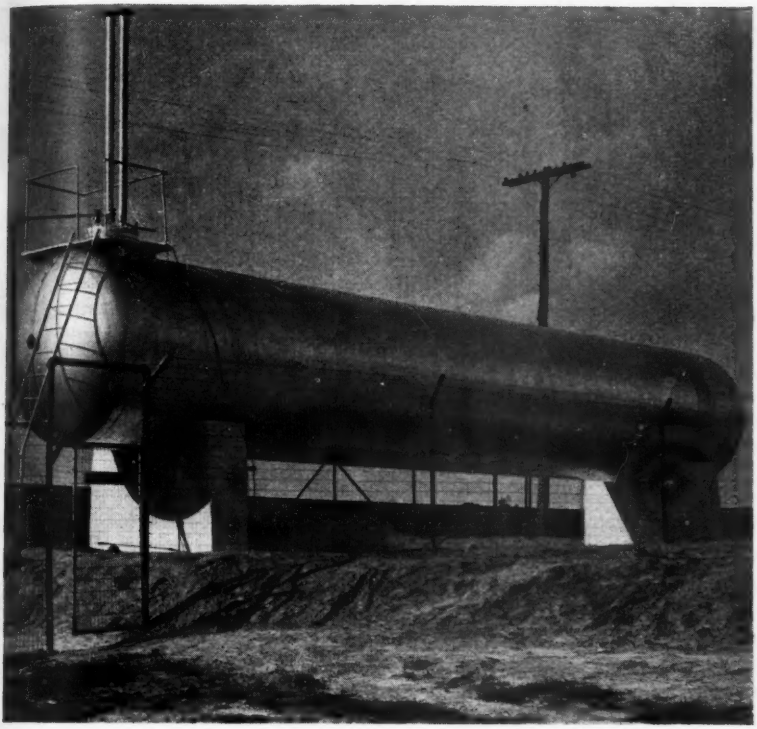


FIG 2.
NORMAC SELF-LOCKING COUPLING

pose of insuring metallic and, therefore, electrical continuity through the joint, in spite of the presence of the rubber gasket. This electrical continuity is necessary when the pipe forms part of an electric circuit in connection with electrolysis bonding or cathodic protection installation.

— When Peak Demand Arises



Liquefied Petroleum Gas storage tanks by Lancaster offer you that extra reserve so important in maintaining satisfied customers when a peak demand arises.

We have had wide experience in the design, fabrication and installation of butane and propane bulk storage plants in accordance with the A.S.M.E. Code. Our Engineering Department offers you a complete design and estimating service which is yours for the asking.

Please send us your inquiries today for prompt attention, with no obligation on your part.

BULK TANKS SKID TANKS TRUCK TANKS

GAS PLANTS FOR MUNICIPALITIES

LANCASTER IRON WORKS, INC.

Lancaster Pennsylvania

Change-Over Methods and Practices

In Adjusting Appliances for the Utilization of Higher Btu Gas

Part 2

By ROBERT L. RUNDORFF

Northern States Power Co., Saint Paul

Special Equipment

Industrial and commercial equipment includes special equipment where in many instances it is necessary to replace burners, modify the length of burner tunnels, exchange venturi throats in proportional mixers, replace gas-air torches or alter them by installing a natural gas tip and increasing the length of the mixing tube.

Practically all of the equipment used by dentists and laboratories needs to be exchanged. Much of this equipment must be provided with ignition rings to prevent flames from blowing off.

Mechanics of Change-Over

The extent of the planning for a change-over will depend upon the size of the community and whether there is one or several communities to be changed over. The plan of a change-over will usually be as follows:

1. *Survey.* A survey should be made of a sufficient number of domestic customers so that a cross section of the equipment in service can be obtained. In some instances, the equipment of each customer has been listed and the materia required for each customer's equi ment has been packaged and su plied to the change-over man wi the order for the work.

Make Survey First

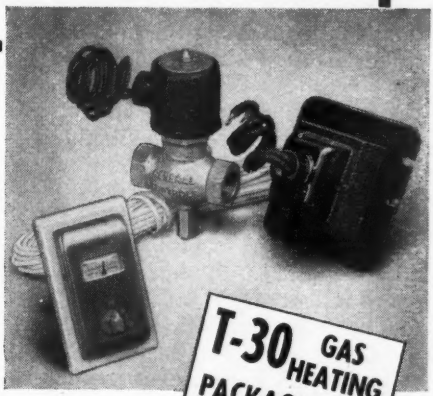
We do not believe this is nece sary when the adaptability of t materials available for chang overs is considered. However, t majority of industrial custome should be surveyed so that pla can be made and materials obtain for their change-over previous t the start of the work.

2. *Preliminary Testing Wor* Testing work should be carried o

---

The mechanics of changing over a gas distribution system and the appliances it serves to a gas of different heat content is a subject of widespread interest. In this article Mr. Rundorff gives a general description of the policies and methods which his company has adopted in change-over work, including a brief description of the two general methods used, materials and special equipment needed, methods of changing burner port areas, customer surveys, preliminary testing, crew organization and training, and general publicity. Mr. Rundorff's paper was presented before the Mid-West Gas Conference and School, Iowa State College, Ames, Iowa, in October, 1945.—Editor.

Economical THERMOSTAT SETS

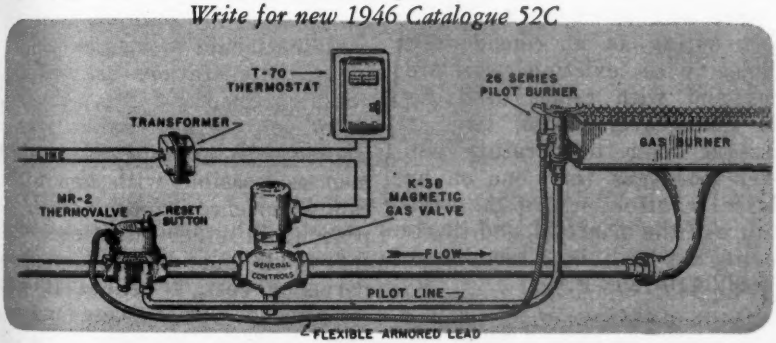


For controlling natural, manufactured and L. P. gases to boilers, floor furnaces, conversion burners, warm air furnaces and scores of other industrial and commercial applications. Finely engineered. Field proved. Set includes Type K-3B two-wire solenoid gas valve, T-70 Metrotherm, transformer and 30 feet of cable.

Typical Installation Diagram

for controlling L. P. gases illustrates the new MR-2 electro magnetic Thermovalve with a 26-R Series pilot burner and flexible thermocouple. 100% gas shut-off is assured in case of pilot failure.

Write for new 1946 Catalogue 52C



GENERAL CONTROLS

801 ALLEN AVENUE — **GLENDALE 1, CALIF.**

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to prove the plan of change-over and to supply necessary details to edit a change-over manual. The laboratory should be maintained during the change-over to check operation and to work out the change-over of any unusual or "trick" appliances.

The manual should be in sufficient detail so that it can be used in the training of the industrial and domestic crews. It should include tables giving the flow of the final gas through the orifices decided upon, as well as tables showing orifice sizes to be used for various oven sizes, for burners which are not standard, based on the number and size of their burner ports, and any other pertinent data which would be usable.

In our contemplated change-over, we expect to furnish two manuals, one for domestic and one for commercial and industrial work.

It has been our experience that the delivery of gas through the type of orifice with which we have been experimenting is at considerable variance with existing standard tables and with tables used for other changeovers. Also, that an orifice at room temperature will deliver more gas than one on an enclosed manifold where the temperature of the manifold, and therefore of the gas, is increased to probably 110-120° F.

3. *Organization of Crew and Training.* There have been a few instances where an outside concern has been commissioned to perform the entire change-over. In these instances, men have been loaned from the local utility to the outside concern to provide the necessary tie-in with local conditions.

The majority of change-overs, however, has been carried on by the utilities themselves. One man should be placed in charge to organize and supervise. The skeleton organization should be built as much as possible from employes of the local utility, while the actual field work is done by experienced change-over men, supplemented by local men who are hired and trained for the job.

Proper identification must be provided for the men. This can be made more positive and the appearance of the crew improved if an overall type of uniform is supplied.

Utility Experience Important

The experienced change-over men will require training in the plan in which the change-over is to be done. The local men will require this training as well as training in gas adjustments, appliances and materials. It is my opinion that crew captains should be men experienced in utility operations as well as in gas utilization.

On any large change-over, it would be desirable to have as many men as possible with gas utilization experience loaned for this purpose from other utilities. While this would undoubtedly increase supervision cost, I believe it would improve the actual change-over and result in fewer complaint calls after completion.

Crews should consist of approximately 10 men, one of whom would be a special man. The ordinary change-over men would work on ranges and side-arm water heat-

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WEDGEWOOD LP Gas Ranges

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● Skilled WEDGEWOOD engineers are working constantly to improve the product of the James Graham Mfg. Co. That is why WEDGEWOOD today not only retains its leading position but makes it doubly secure.

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JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

STANDARD TOOLS AND EQUIPMENT

Used by Appliance Adjusters on Chicago Change-Over

1. Assorted orifices
2. Adapter anvil
3. Reamer handle
4. Crescent wrench
5. Pliers
6. File
7. Hack Saw
8. Hammer
9. Soap can and brush
10. Valves—⅛ in.
11. Swab brush
12. Stove cement
13. ½ in. and ¾ in. pipe caps and plugs
14. Large reamer, crimping and extractor tools, thumb reamer, No. 6-32 tap
15. Handbook
16. ¾ in. washers
17. Assorted bolts, ⅛ in. manifold plugs
18. Thermometer
19. Key grease
20. Matches
21. Stove broaches
22. Binder
23. Meter washers
24. Soap and rag
25. Wire brush
26. Wooden plug
27. 2 in. screw driver
28. 6 in. screw
29. Socket wrench
30. 4 in. screw driver
31. 10 in. wrench
32. Flashlight equipment for special men
33. Assorted orifices
34. Drill gages
35. Handbook
36. Snips
37. Drill index
38. 10 tap wrench
39. 12 tap wrench
40. Assorted taps
41. Hand drill

ers; the special men working on automatic water heaters, mangles, incinerators and any difficult jobs which the ordinary change-over man is not qualified to handle.

Industrial Crew of Experienced Men

The industrial crews would consist of experienced change-over men and in districts where commercial and industrial equipment is concentrated, the special men on the domestic crews would be transferred temporarily to the industrial crews.

It has been the experience of most utilities that one week's training for inexperienced men will suffice. The school must operate continuously for some time previous to the start of the change-over in order to provide trained men in sufficient volume to proceed with the work.

The quality of the work can be improved and some productive work obtained from the inexperienced men if, immediately after completion of his training, and before the entire crew is assembled, he is sent into the first district along with an experienced man to drill burners.

This would give the inexperienced man more actual experience with different types of equipment and with gas adjustments. There would be some inconvenience to the customer in the added call, but also

some benefit in that the exchange of orifices would not take as long on the change-over.

A complaint crew will be required to clear complaints connected with the change-over work. Complaints will follow the usual run, with increased calls for burner adjustments and change-overs to be made at specified times. The complaint man should complete the change-over or the final adjustment on a call if it has not already been done.

4. *Tools and Materials.* It is necessary to supply a kit of tools to each man, for while the experienced change-over men usually carry their own tools, the local men will not have tools. In order to carry on the work in the manner specified, it will be necessary to supply a kit to each man.

Tools should be charged out and withdrawals to replace worn out or broken tools should be covered by the return of the old tool. Withdrawals for loss should be charged to the man and the amount with which he is charged for such loss on the termination of his employment will be determined by company policy. A clearance tool slip should be furnished to the paymaster before a man's final check is issued.

A shop is necessary to make repairs, and to do work which it is not possible to do on the customer's premises. This may consist of shop conversions, welding, repairs, drilling impossible to do in the field, and any other suitable work. We contemplate the use of a portable shop which would be moved from section to section as the work progressed.

Special purchasing and warehousing will be required for a change-over of any material size. On a large change-over, 25 to 30 days' supply of material should be on hand, with special material, known to be required, to be on hand as early as possible. Working material for the change-over man can be furnished by a supply truck in the district, by the warehouse if kits are turned in each night, or by the foreman who can be supplied with the necessary materials for his crew.

The method used depends largely upon the particular warehouse set-up and on the size of the crew. We believe that an exchange method could be used on a large change-over where the depleted material kits would be replaced when necessary with duplicate sets of filled kits. The depleted kits would then go to the storeroom for replenishment. Since the items used are small and of low individual value, all should be accounted for by weight.

5. *Publicity and Printed Forms.* There are two schools of thought on publicity, one being that general publicity is desirable, while the other opinion is that only the sections being worked in should be notified. We believe that the publicity to be used depends to a large extent on the size of the change-over.

If the change-over is small, then general publicity should suffice, but if large, only the district being worked in should be notified. We believe this will minimize the num-

ber of inquiries from the other districts where people might wonder when the change-over men might be expected.

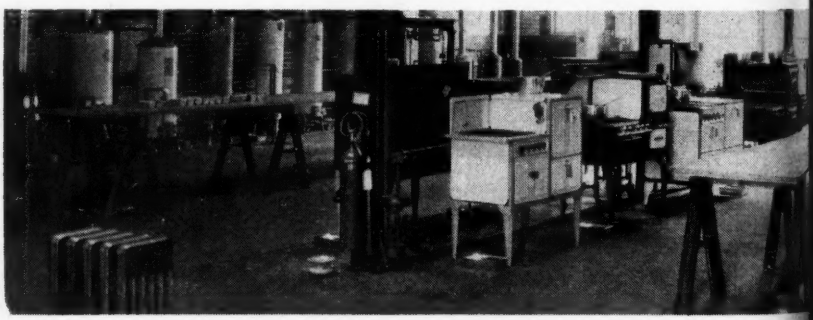
If the two step method of change-over is used, some information should be given to the customer at the time of the first adjustment, advising him that the adjustment is only temporary and that the change-over man will return after service of the final gas.

In addition to publicity on the change-over, printed forms will be required for the execution of the work, tags for shop repairs, warning tags to warn against the use of unsafe equipment in the process of repair, or where change-over will not be completed until the final gas is served. Also, no vent tags to warn against the use of water heaters or other appliances which require proper venting.

One property, as a safety measure, has reduced Btu. inputs on side-arm water heaters without vents so that the possibility of carbon monoxide being formed is very remote. They advise the custom that when the heater is proper vented they will, on call, increa the Btu. input to the heater. T has proved quite effective.

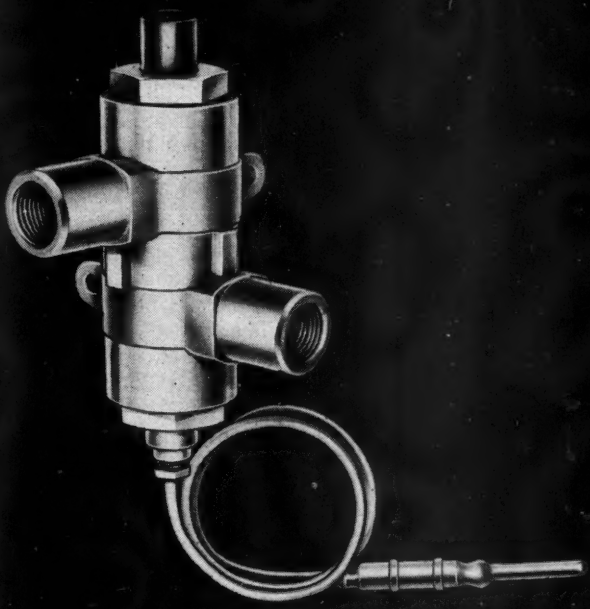
6. *Transportation.* Transport tion should be arranged for supe visors, crew captains and complai men. It has been the custom f the utility to lease privately own cars at a flat daily rate, plus surance coverage, where sufficie company owned transportation not available. The individual chang over men should not be allowed use their cars on the job.

7. *Sectionalizing.* Sectionaliz will depend upon the distributi system, the method of change-ov and the size of the crew. If the o step method is used, the sectio should be of such size that no cu tomer will be without an adju ment for more than four days. the two step method is used, t size of the sections will depe largely upon the layout of the di tribution system and to some e tent on the size of the crew.



View of appliances set up in classroom manner for training change-over appliance adjustors.

NEW THERMO-MAGNETIC SAFETY PILOT



Four New, Important, Exclusive Features

- Flow Interrupter
  Flow of gas to the burner is prevented during lighting operation — an additional safety factor.
- Flexibility of adaptation inlet and/or outlet connections can be changed on a radius to any of four positions.
- Large set button.
- All aluminum body.

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HEAT CONTROL, LTD.
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believe completion of the first adjustment in a section should not exceed three weeks, and that the final adjustment can then be made in one week to 10 days.

8. *Meter Reading.* On some change-overs, a meter reading is made by the change-over man at the time of the final adjustment. On the other change-overs, instead of a meter reading, a prorated bill is made from the regular meter readings and is based on an arbitrary split of consumption of manufactured and final gas, taking into consideration the date when the final gas was first served in each district. This second method, we believe, is preferable and can be justified provided a rather liberal policy is adopted for the adjustment of high bill complaints.

Change-Over Procedure

9. *Actual Change-Over.* The first step in the actual change-over is the furnishing of an order. The method has been used where every house in the area served by the distribution system is called on and if there are gas burning appliances, the customer's name and address is listed and the change-over is made. If a two step method is used, this same process is followed on the second round, no reference being made to the records of the first call. In most change-overs, however, a conversion order is issued which is made from the accounts receivable addressograph plates. These orders are then arranged for the sections and issued by a dispatcher, with a control c kept to guard against loss of order. On the second call, we lieve a second change-over should do the final adjusting minimize "sidewalk" change-ov

Town Divided Into Sections

In one of our properties, tentative plans call for a two change-over in which the town be sectionalized. Pressures will raised to approximately 8 in. section and the first call made all customers in that section. fices will be changed to a fixed fice type of primary air com device, chosen so that on final justment air shutters will be proximately one-half open. burner ports on star burners be drilled to a No. 35-drill size the exception of the inner po which will be drilled to a No. in order to prevent torching of burners.

Side-arm water heater burn will be drilled to a No. 32 with similar provisions for the p vention of torching. Oven burn ports will be drilled to a No. drill size with additional car over ports drilled No. 45. Duri intermediate service and after t adjustment is made, flames will very sharp; just sharp enough that they will not flash back in mixer either when operating or turn-off. When the final gas served, a clean flame will be exp enced in the most cases which only require a slight adjustment the air shutter on the second to produce satisfactory flames.

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gives you MORE to sell ...and more to sell with!

TAPPAN—it's been famous for quality for 65 years. It's built tremendous popular acceptance and good will. Demand for TAPPAN is big, and growing all the time! It has MORE Extra Features—and many of them famous TAPPAN feature "firsts"— Divided-Top, Visualite Oven, Cove Top, Tel-U-Set, etc.

TAPPAN *gives you MORE Sales Helps*

Continuous national advertising, seasonal selling programs, display service, newspaper mat service, posters, New Freedom Gas Kitchen Planning Booklet, point of sale demonstration outfits, sales training, Tappan "Sales Maker"— all modern, up-to-the-minute sales makers!

And constant TAPPAN Research and Engineering to assure a continually improving product! Specially engineered models for L. P. Gas.

The TAPPAN Stove Company

Established 1881 ***Mansfield, Ohio***

Oklahoma Fire Marshal Issues New Industry Rules

New rules relating to construction and inspection of liquefied petroleum gas tanks and to the transportation of B-P Gas on the highways have been issued by T. J. Ellis, Oklahoma state fire marshall. These are:

"(1) Every liquefied petroleum gas tank used in this state shall be constructed in accordance with and conform to the requirements set out in pamphlet No. 58 of the National Board of Fire Underwriters, and also the requirements set out by the American Society of Mechanical Engineers (ASME) code, Paragraph U-69, 1943 edition.

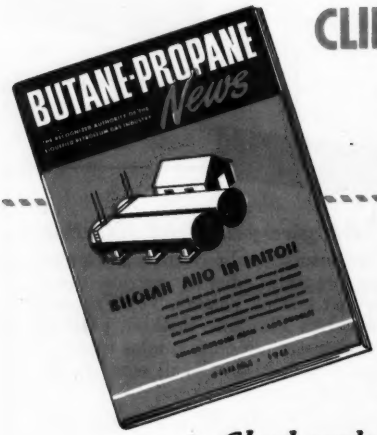
"(2) Every liquefied petroleum gas pressure vessel manufactured, sold or used in this state shall be inspected by a qualified inspector holding a National Board of Boiler and Pressure Vessels commission.

"(3) Every transporter of butane and propane gas shall have his transportation tank truck inspected by the state fire marshall or one of his inspectors and have issued to him identification card, form No. 11, describing said equipment, before using same on the highway."

California Issues New Code for B-P Gas Industry

California has new safety orders governing the liquefied petroleum gas industry. These became effective July 1, 1946.

Titled, "Liquefied Petroleum Gas Safety Orders" this new code has been in the process of preparation for several years. It is the result of many open meetings attended by in-



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stry members to enable authorities incorporate into the orders the st thinking of experts and insure irness to all branches of the indus- without sacrificing needed safety ecautions.

The new orders were prepared by e Division of Industrial Safety, epartment of Industrial Relations, the State of California. The first lifornia code for B-P Gases was ued in 1934.

Enforcement of the orders will be the Division of Industrial Safety which the Boiler Section is a part. Agaton is the supervising boiler fety engineer. Inspections are al- ady being made under the new de and additional personnel is to be ded.

The open meetings with industry embers have been under the chair- anship of C. H. Fry, chief of the ivision of Industrial Safety. The In- strial Safety Board is composed of Paul Scharrenberg, chairman, Ernest E. Duque, Howard T. Geiger, J. F. Hatton and P. M. Sanford.

The California Safety Orders sell for 26 cents per copy.

Harris Shine to Direct Sales of Corken LPG Truck Pump

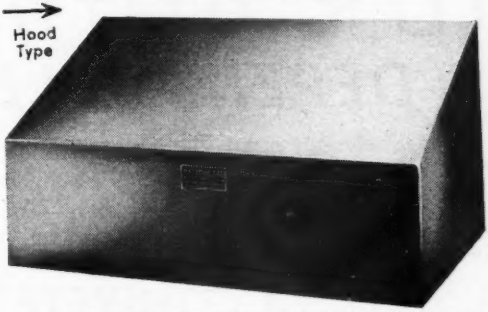
Harris Shine is now with the B-P Gas equipment department of Corken's, Oklahoma City. Mr. Shine was a captain in the Air Force assigned to the development program of jet propulsion. His technical training and background is expected to serve him in good stead in the work of adapting pumping equipment to LP-Gas movement, in the opinion of Charles M. Corken.

Mr. Shine will organize and direct distribution of the new "Corken LPG Truck Pump" which goes into mass production in March.

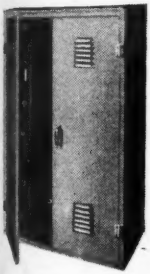
OXFORD Bottled Gas CABINETS

Made in three styles — Single Hood, Dual Hood and Full Size. Sturdily constructed of heavy metal with protective coating of paint or galvanized to insure rust resistance. Write for prices and detail.

Hood Type



Full Size Cabinet



Thousands of Oxford Bottled Gas Cabinets, Full Size, Single Hood and Dual Hood Types, are in use in many parts of the country giving satisfactory service over many years.

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Insures vaporized gas in any degree of cold weather. Outstanding superiority is that it is installed OUTSIDE the tank—always accessible. Write for details and prices.

The Oxford Company • Oxford, Penna

Texas Railroad Commission Names Additional Inspectors

The naming of two additional inspectors to the liquefied petroleum gas section of the Texas Railroad Commission has recently been announced by Col. E. O. Thompson, member of the Commission.

Employed out of funds derived from fees of LP-Gas licenses, the men will be used to enforce the rules and regulations covering the industry, Col. Thompson stated.

William Peyton, former employe of the Commission and until recently in the butane business himself, will be inspector for the eastern part of Texas, with headquarters in Kilgore. James Seay, petroleum engineer by profession, will be with the Austin staff, working out of the state office.

Col. Thompson also stated that the Commission plans to add four additional inspectors as quickly as qu ified men become available.

Lou Marshall Returns from W To Head Michigan Company

Lou Marshall, honorably discharg from the Army recently, has accep the office of president and the po tion of general manager of Petgas Co., Petosky, Mich., accord to an announcement made recently

Mr. Marshall served 23 mont overseas with the Eighth Air For advancing to the rank of major.

Petgas, distributors of bottled g with 25 authorized dealers in sections of northern Michigan, has bulk plant with a storage capacity 100,000 gallons of propane.

Established in 1941, Mr. Packa is vice president of the company; C. Curtis, secretary; and C. F. Curti treasurer. Mert Perry is plant supe intendent.

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While you bake cakes, pies, biscuits, here!
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Ends last-minute mealtime hurry-flurry. For the largest rib roasts, legs of lamb, even whole hams and turkeys never ask for an inch of precious oven space in the new Estate Heatrola Gas Ranges. They have their own separate meat oven — the Bar-B-Kewer — freeing the regular oven for baking pies, cakes, biscuits at the same time, without crowding or temperature juggling. Millions of women are reading about it in the national magazines. They'll be looking for it in your display room.

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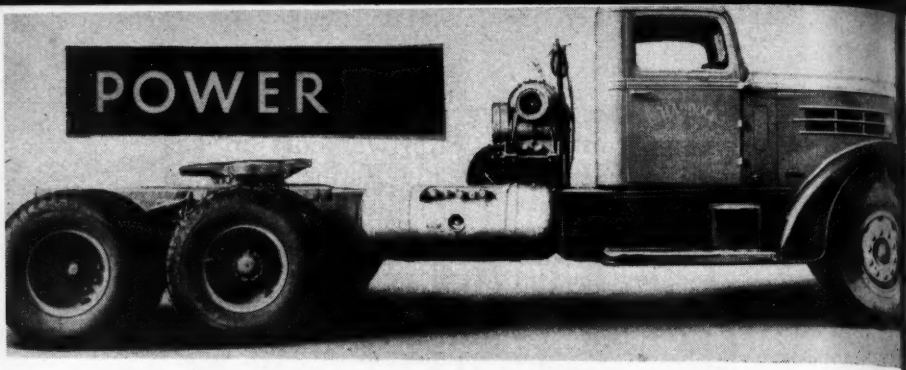


The A B C's of Butane-Propane for Engine Use

By E. A. STRATMAN
Advertising Manager, Ensign Carburetor C
Huntington Park, Calif.

In Two Parts—Part I.

ON the West Coast and in the Mid-Continent butane-propane has long been used for farming, trucking, stationary power, oil well drilling and servicing. The trend is moving northward and eastward as large storage and dispensing facilities are made available. Here are some of the claims made by old-time users of liquefied petroleum gas as an engine fuel:—

"With a 28,000-lb. gross load the average fuel consumption with my semi and trailer is 6 miles per gallon—a fuel saving of ½ cent per mile. Periodic inspection and overhaul at 100,000 miles — cylinder wear .006-inch taper. No carbon or oil dilution."

Another large fleet operator states, "Twenty-five of our heavy trucks averaged 5.7 miles per gallon as compared to a previous aver age of 5.0 miles per gallon fo gasoline; 35% saving in maint nance, mainly in ring replacemen valve grinding and reboring. No ticeable improvement in power."

"Operating 40 trucks on heav dirt haul for over 14 months an no trouble. Saving in fuel, alon equivalent to 5 cents per gallon."

A fleet operator says, "On ou 19-ton truck hauls we average be tween 4¾ and 5 miles per gallo on butane, an increase of 25% ove gasoline; 72,000 miles witho touching engines for repairs. Sti using SAE 20 lubricating oi changing every 7000 miles."

These and hundreds of simil claims attest to the tremendous ad vantage of B-P Gas (butane-pr pane gas) over gasoline as an e

ine fuel. It is a premium fuel but an be purchased cheaper than asoline. With wider distribution nd storage of the product, the demand for it in transportation, arming and stationary power is rowing.

The total number of butane engine installations in the country today is probably well over 100,000, some of the first conversions being made in the late 20's. A great deal of engineering research and costly development has gone into experimentation and refinement of carburetion equipment.

Today, there are various makes of butane-propane carburetor equipment, all of which use a vaporizer in one form or another, and pressure reducing regulators with carburetors or mixing valves to proportion air with fuel before mixtures enter the engine inlet manifold for distribution to individual cylinders for combustion. These various makes of conversion equipment differ mainly in the manner in which the commonly accepted principle of butane vaporization, regulation and carburetion is applied.

Points the Discussion Covers

We shall not attempt herein to discuss the manufacture or characteristics of commercial butane-propane except to show a vapor pressure chart (Figure 2). We shall confine this paper to the principle of butane-propane carburetion in its various stages and to elaborate a little on each stage without any technical references. We shall en-

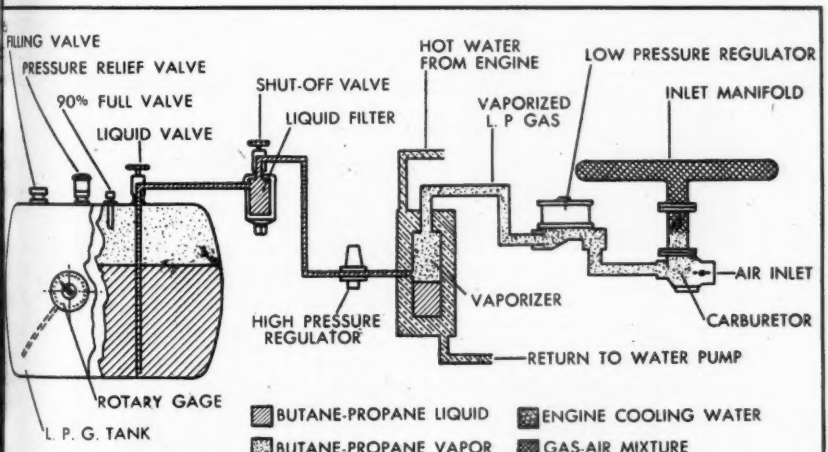


FIG. 1

—FLOW DIAGRAM—
BUTANE-PROPANE FUEL ENGINE APPLICATION

deavor to deal only generally with the following:

1—Why butane-propane is the finest of motor fuels.

2—Characteristics of the fuel. Definition of "butane."

3—The principle of converting liquefied petroleum gas from a liquid to a gas for engine use. The "flow diagram." Why use liquid instead of vapor for internal combustion engines?

4—Comparison and similarity equipment for domestic engine uses.

5—The utility tank for engine stallation.

6—Butane-propane filters.

7—Primary, or high pressure, re ulator.

8—Vaporizer. The application heat.

9—The final, or low pressure re ulator.

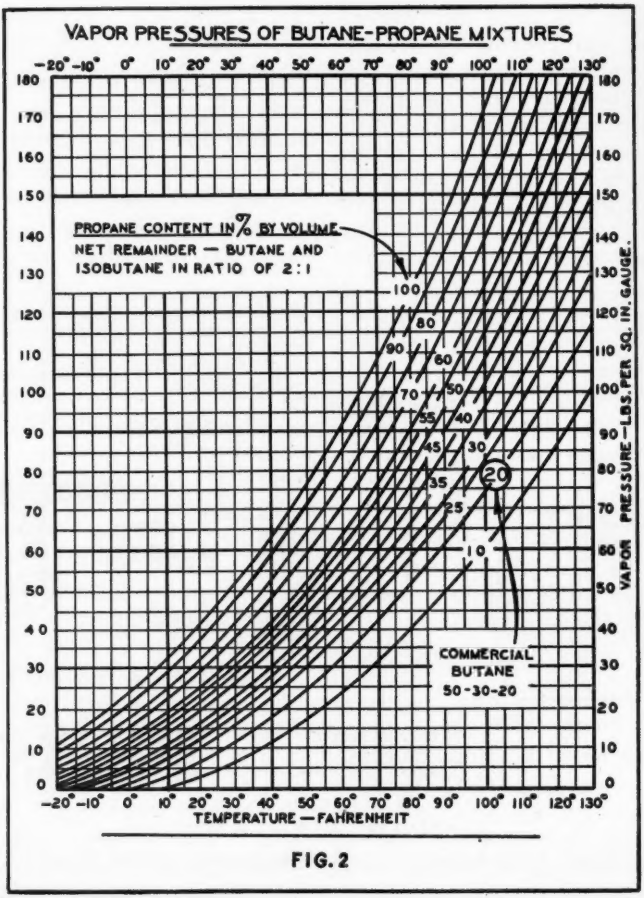
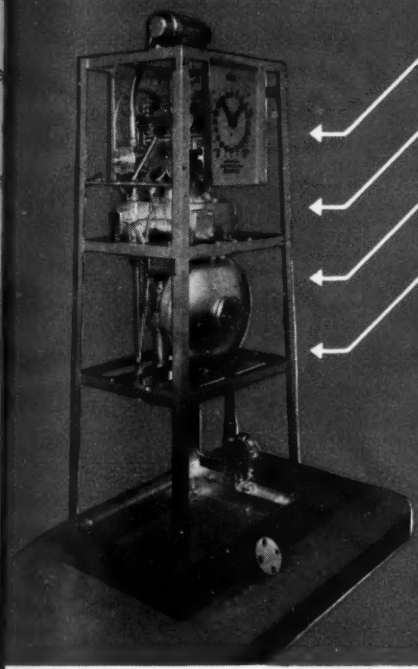

VAPOR PRESSURES OF BUTANE-PROPANE MIXTURES
PROPANE CONTENT IN % BY VOLUME
NET REMAINDER — BUTANE AND ISOBUTANE IN RATIO OF 2:1
COMMERCIAL BUTANE 50-30-20
VAPOR PRESSURE—LBS. PER SQ. IN. GAUGE.
TEMPERATURE—FAHRENHEIT

FIG. 2

Designed by ADEL for L.P.G...



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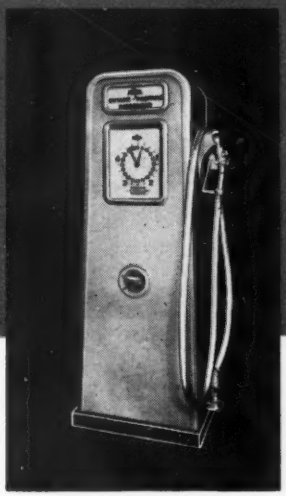

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3406 Main Street, Dallas 1, Texas

10—Carburetion (proportioning and mixing of air and fuel).

11—The engine. Characteristics most ideal for maximum efficiency on butane-propane.

Why Butane-Propane Is the Finest Of Motor Fuels

Butane is a "natural" for engine use. It would be extremely difficult to conceive of a fuel specification more ideally suited. Having an octane rating of over 100 as compared to about 85 for the best co mercial gasoline with ethyl flu performance is unexcelled; e nomical, smooth and witho "ping." With this high anti-kno value, engine compression pressur can be raised 10% to 20%, there taking full advantage of the high octane fuel with resultant increas power output.

Butane is converted from a liqu in the fuel tank to a perfectly d gas before reaching the combusti

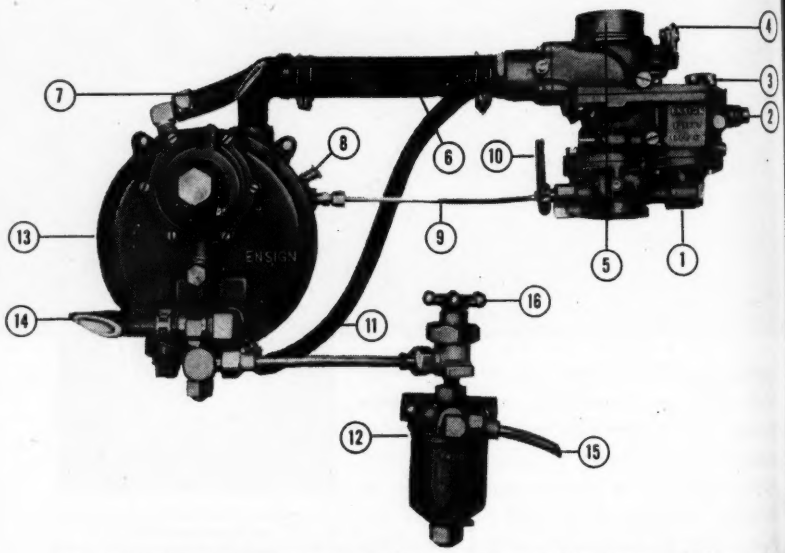


Fig. 3. Combination butane and gasoline carburetor and butane regulating unit incorporating high pressure liquid expansion valve, vaporizer and final, or low pressure, regulator.

1. Downdraft Combination Carburetor
2. Gasoline Inlet
3. Gasoline Float Lock
4. Easy Starting Choke
5. Air Inlet
6. Vaporized Butane-Propane Line
7. Hot Water from Engine
8. Idle Adj. Screw
9. Idle Line
10. Carburetor Throttle Lever
11. Balance Line
12. Liquid Butane-Propane Filter
13. Butane Vaporizing and Regulating Unit
14. Water Return to Pump
15. Liquid Butane from Tank
16. Liquid Butane Shut-off Valve

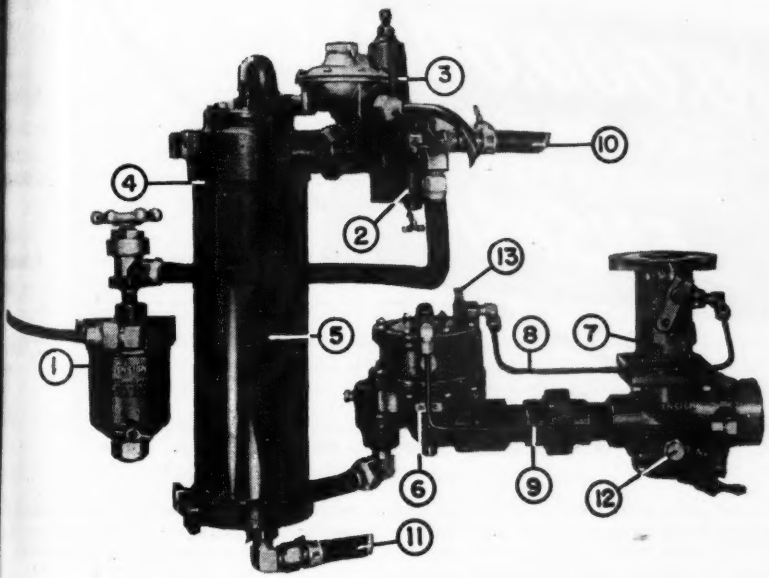


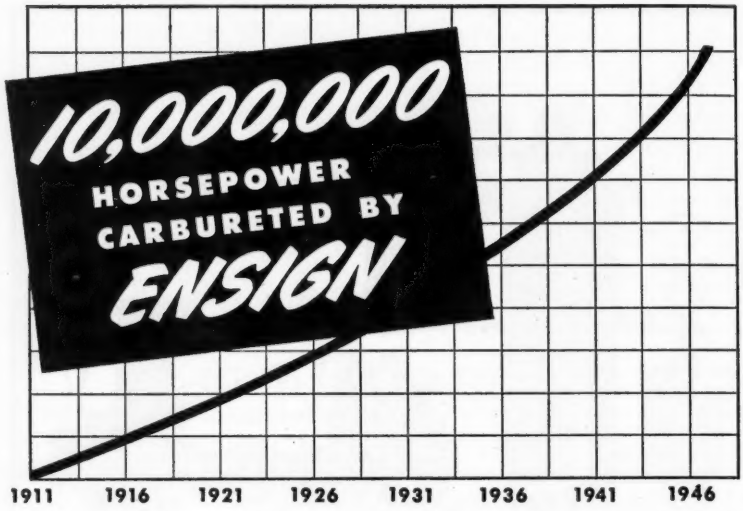
Fig. 4. Straight butane gas carburetor and butane vaporizer with separate high pressure liquid expansion valve and separate final or low pressure regulator.

1. Liquid Butane Filter
2. Fuel Inlet and Strainer
3. High Pressure Reducing Regulator
4. Butane Vaporizer
5. Butane Gas to Carburetor
6. Low Pressure Reducing Regulator
7. Carburetor (Straight Gas)
8. Idle Line
9. Balance Connection
10. Hot Water from Cylinder Head
11. Water Outlet
12. Load Adjusting Screw
13. Idle Adjusting Screw

amber. By good carburetion, orough mixing of dry gas with r for uniform distribution roughout the manifold is achieved. ith gasoline, or wet fuel, this niform mixing and distribution is ever attained.

With complete burning at a rate ower than gasoline, butane makes or smoothness of operation because of prolonged power impulses on the power stroke and more uniform bearing pressures.

Being a dry gas, crankcase dilution is impossible; all ill effects, as thinning of lube oil, washing lube oil from cylinder walls with resultant cylinder wear, are entirely eliminated. Lubricating oil can be safely run 5 to 6 times longer than



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Efficient carburetion is something more than merely mixing air and gas—that's easy. Air and fuel must be metered, regulated and proportioned so that correct air-fuel ratios are automatically at hand to meet every engine demand. Mixtures must be right on the beam throughout the entire range of speeds and loads—else, no power or economy. The vast multitude of engine variables are balanced and worked out one by one in our laboratory before we place our seal of approval on PERFORMANCE.

Accurate, rigid QUALITY CONTROL also is of extreme importance to ENSIGN users. Examine any ENSIGN product anytime—good, sturdy, serviceable—the quality is there. Rigorous inspection of materials and processes PLUS sound engineering design results in a dependable and uniform product.

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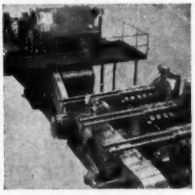

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Butane costs less per gallon than soline and this fact, combined h the above mentioned advan- es, results in an overall saving ranging from 25% to 50% when the important factors of the conversion are properly handled. It will be clearly understood, a definite statement as to the exact savings obtained from butane for ALL installations obviously cannot be made. Condition of the individual engine and other variables influence results.

Characteristics of the Fuel. Definition of "Butane."

The word "Butane" used herein applies to the mixture of butane and propane. Straight butane or straight propane or any mixture of butane and propane may be used as an engine fuel. Both have similar characteristics. Propane, with a lower boiling point, is conse-

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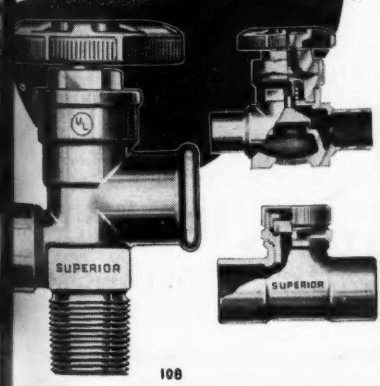

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quently a higher vapor pressure fuel and is added to butane for cold climate operation as a pressure-building constituent.

Bottled gas used for domestic household installations is almost entirely propane with an exceedingly low boiling point of 44° below zero. That is, an open container of propane would boil at —44° F. and give off vapor until it gradually disappeared. Propane is therefore handled in very strong containers designed for a working pressure of 250 pounds per square inch.

As noted in the vapor pressure chart (Figure 2), 100% propane would have a pressure of about 175 pounds at 100° F. Also observed from Figure 2 is the vapor pressure of "commercial butane," having a propane content of 20%. At 100° F. the pressure is only 75 pounds. "Commercial buta varies in its propane content cording to the localities in wh it is used. Refineries blend the f in this manner to assure sufficie working pressures for its ultim use. For a complete treatise liquefied petroleum gases, th behavior, and utilization, refer "Handbook Butane-Propane Gase published by Butane-Propa News.

In California and other war climates only a small percentage propane is required while in t Northwestern and Eastern stat nearly 100% propane is used. T trend seems to be toward straig propane in more localities. T would require the use of the heavi propane tanks and would elimin the danger of filling light weig

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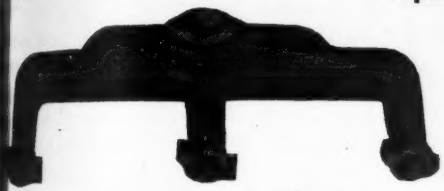

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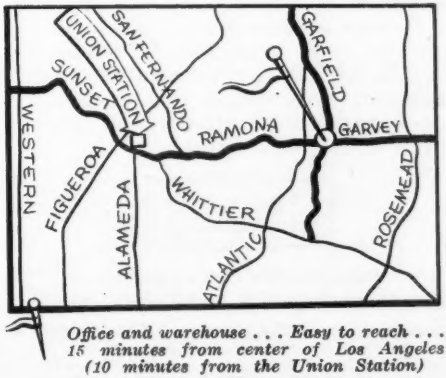

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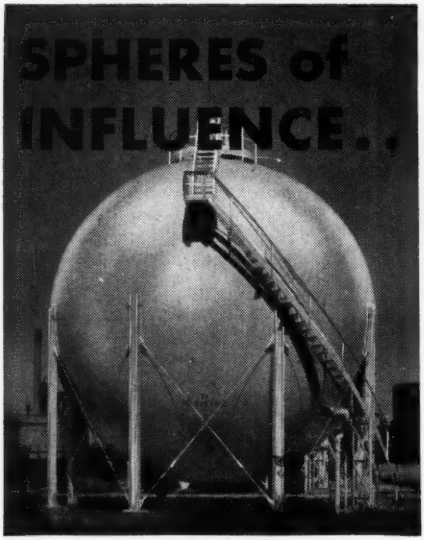

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butane tanks with high pres
propane.

However, since the engine fu
still a mixture of butane and
pane and is commonly referre
as "commercial butane," or "
tane," we shall also use the te
"butane" herein as meaning
mixture of butane and propane
blended by the manufacturers.

Principle of Operation. Butane Equipment for Engine Use.

When considering the utilizati
of butane and propane, whether
be for domestic household uses
for the internal combustion engi
it is well to bear in mind that

DOMESTIC FUEL DEALERS in ma
parts of the United States have not as y
explored the possibilities and advantages
liquefied petroleum gas as an engine fu
Many such dealers and users of butan
propane for household appliances wou
like to know more about the fundamenta
of engine conversion and of what the c
buretion equipment consists.

This article on the subject is intentio
ally extremely elemental. Comparisons a
drawn between the ordinary househo
bottled gas installation and the automoti
installation.

In many Western and Mid-Continent lo
calities where B-P Gas has long been us
for automotive and industrial engines,
number of domestic fuel dealers are fin
ing it helpful and profitable to set up
dispense this fuel for the engine tra
as a means of balancing their winter a
summer fuel loads.

Farming with butane-equipped tracto
is economical, efficient and clean. On
large tractor manufacturer already sup
plies butane or gasoline carburetion
optional equipment.—Editor.

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liquid fuel under pressure is c
stantly striving to return to
gaseous state under which it w
first captured at the refinery

New Rheem Water Heaters, packed with improvements, are rolling off assembly lines

ALL NINE RHEEM appliance plants are once again manufacturing things that make living more comfortable. Automatic water heaters for all fuels, floor furnaces, console and wall heaters, automatic coal stokers, water softeners, range boilers and other items are coming off our lines in daily-increasing volume.

These latest versions of time-tested Rheem appliances come with important new features.

You'll be glad to know, for instance, that the new Rheem 600 Automatic Gas Water Heater pictured above is equipped with the Rheem-built 100% Control. This vital safety feature utilizes the Baso-Thermal Magnetic principle . . . guarantees positive shutoff of both the main gas supply and the pilot gas supply if the pilot light goes out. The Rheem 100% Control is designed and made for use with all types of gases.

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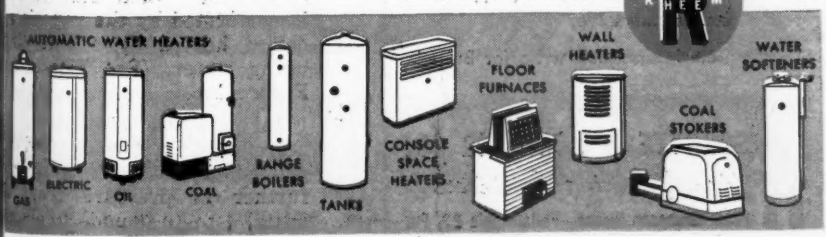
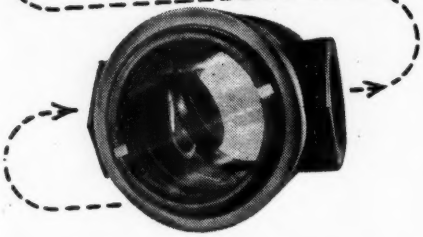


SK FLOW INDICATORS

"positive knowledge eliminates mistakes"



• When an SK Flow Indicator is installed in your pipe line you can know exactly whether a gas or liquid petroleum is flowing, whether flow is slow or fast, and its direction. There is no need to guess. Costly errors can be eliminated; time can be saved. These indicators are widely used on bottled gas trucks to show, by indicating no flow, both when tank on truck is full and when tanks filled from the truck are full and for many other applications.

SK Flow Indicators meet pressure specifications of extra heavy pipe fittings. Glass is tempered plate, thermal-shock resistant and practically unbreakable. For use at pressures up to 250 psi and at temperatures up to 250° F. Flapper type indicators, having threaded connections, are supplied in sizes from ½ to 3 inches and Rotary type from ½ to 2 inches, inclusive.

For complete information write for Bulletin 18-W.

SCHUTTE & KOERTING CO.
Manufacturing Engineers
1148 Thompson Street Philadelphia 22, Pa.

liquefied. One need only crack valve on the tank and the liq spews out in force in much same manner as steam is relea The liquid almost instantly tu into a vapor and disappears in atmosphere. This presents a m ideal set of conditions for the signer of carburetion or domes appliances.

But simply to release the liq to the atmosphere in a wild a uncontrolled manner is not enou The volume or rate of flow must predetermined. After the fuel h reached the vapor stage, the pr sure must be dropped to a unifor workable value. When liquid but expands and vaporizes, it increa in volume very rapidly, there causing a refrigerating eff which would freeze up the mech ism were it not for the applicati of heat or a differential in tempe ture between the expanding but and the expansion chamber.

The principle of operati broken down into four stages close examination, are as shown the flow chart (Figure 1) in t following order:—

1—**Primary or high pressure re lation.** Liquid butane is drop from tank pressure (20 to pounds) down to a regula 4 to 10 pounds.

2—**Application of heat to the re ly expanded fuel.** This funct is performed by the vaporize device heated by engine cir lating water. (See Flow Cha **Figure 1.)**

3—**Final pressure regulation.** thoroughly vaporized and panded butane must be drop further in pressure from initial 4 to 10 pounds to slig

The SEAL OF CONFIDENCE IN THE GREAT LP-GAS INDUSTRY

A SOLDER SEAL TiteSeal PRODUCT

TiteSeal

THE COMPLETE GASKET AND JOINT-SEALING COMPOUND

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- Seals Against All Acids, Oils, Gases, Heat and Vibration
- Permits Easy Disassembly and Prevents Rust and Corrosion

For a perfect, long lasting, leak-proof Seal, Always Specify TITESEAL. TiteSeal performs extra services. It allows fast and easy disassembly, because it never hardens, never sets—remains soft and plastic always. The Liquefied Petroleum industry depends on TITESEAL. It is used in plant maintenance and appliance installation; on mains and service lines, leak-sealing pipe joints and flange joints above and below ground. TITESEAL HOLDS THEM ALL.

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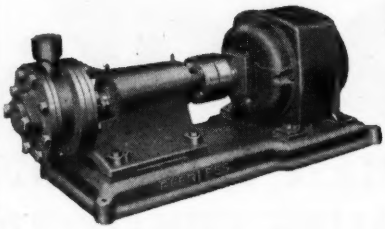
(Formerly Dayton-Dowd)



TYPE T

—for Butane & Propane service

No frictional contact; freely rotating impeller eliminates casing contact. Inherently self-priming. Handles highly volatile liquids without becoming vapor-bound. Hydraulic balance; twin inlets distribute liquids on each side of the impeller, eliminating thrust load on bearings. Handles high pressure; standard model develops up to 200-lbs. in a single stage. Other models for higher pressure.

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below atmospheric (about
inch water pressure, minus).
final pressure regulator must
only shut off the fuel a lit
below atmospheric pressure, p
venting any leakage, but m
also be so designed as to
stantly permit vaporized but
to flow to carburetor and engi
in metered volumes to confo
automatically to every engi
demand.

4—**Carburetion.** This last stage
both a mixing function—mixi
fuel and air—and a means f
proportioning or measuring
gas and air for the right m
ture strengths. Coordination
tween the final pressure regu
tor and carburetor must be p
fect throughout the entire ra
of engine speeds and loads, fr
fast acceleration to wide o
throttle and back to idle. Fl
characteristics of the carbu
tor and regulator must fol
very closely the engine dema
—richer for heavy loads, lea
for cruising. This performa
must be instant and without
riods of erratic over-richness
lean flat-spot operation.

The question often asked
"Why not use vapor off the top
the butane tank for engine use
eliminate the vaporizer?" It is p
sible to use tank vapor and it
often done. However, vapor in su
cient quantities is not always av
able for maximum loads, especia
when the temperatures are low
when the propane content of
fuel is also low.

Long experience has proven t
a more uniform result is achie
when liquid fuel is used.

Much better control of fuel
and regulation is possible w

3rd EDITION

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Chapter 2: The ABC of LP-Gas, an Introduction to LP-Gas Operations.

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Chapter 1: Properties of the Hydrocarbons in LP-Gas.
Chapter 2: Properties of Butane-Propane Mixtures.
Chapter 3: Volume Correction Factors.
Chapter 4: Analytical Determination and Testing.

PART 3.—PRODUCTION OF LP-GAS

Chapter 1: Natural Gasoline Plants, Recycling Plants, Oil Refineries.

PART 4. TRANSPORTATION AND STORAGE

Chapter 1: Delivery by Truck, Rail, Water, and Pipe Line.
Chapter 2: Storage Tank and Pressure Vessel Design.
Chapter 3: Liquid Metering and Pumping Systems.

PART 5.—DISTRIBUTION OF LP-GAS

Chapter 1: Installing and Servicing LP-Gas Systems.
Chapter 2: Semi-Bulk Systems.
Chapter 3: Bottled Gas Systems.
Chapter 4: Gas Utility Service From Central Plants.
Chapter 5: Multiple Utility Service From a Central Plant.

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Chapter 5: Industrial Applications.
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Chapter 7: A Fuel for Internal Combustion Engines.

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Section 1: N.B.F.U. Pamphlet No. 58
Section 2: Motor Carrier Regulations.
Section 3: Freight Regulations.
Section 4: Unloading Tank Cars.
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PART 8. APPENDIX

Section 1: Products Liability Insurance.
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A comprehensive presentation of LP-Gas appliances and equipment by the manufacturers of the LP-Gas industry's best known products.

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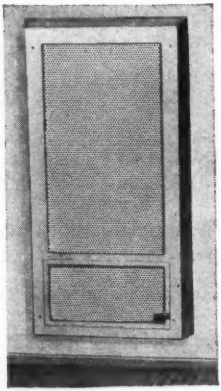

Dual type. 45,000 B.T.U. input. Color, light Ivory. Automatic Temperature control with Wall Thermostat, or for manual control with pilot lighter. Easily installed. Working parts easily accessible. For 2 x 4 inch studs. No pit or basement. Approved by A.G.A. Eligible for F.H.A. loans.
Size of face, 25¼" wide, 50" high.
Size of recess in wall, 23¾" x 48" high.

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working with smaller orifices. Diaphragms therefore may be smaller and ratio of diaphragm areas to liquid valve areas come within a more workable range.

Therefore, with butane regulating equipment built to handle liquid in the first stage, it is obviously impossible to take enough vaporized fuel through these small orifices to do any practical good. It is possible, nevertheless, to operate the engine, in a greatly limited manner on tank vapor, and it is sometimes done in an emergency.

Generally speaking, the four stages involved in the Principle of Operation are simple, ordinary, everyday, mechanical functions. They must be coordinated and worked out together. They are easy to understand if one will first study the flow chart (Figure 1).

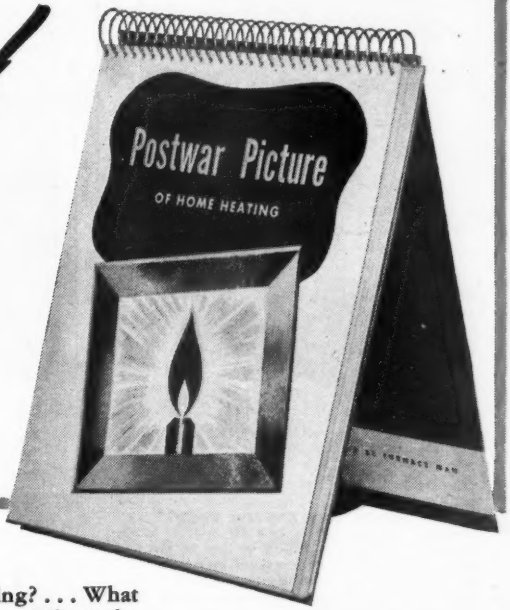
At first glance, the arrangement of equipment shown in Figures 3, 4 and 5 may be a little puzzling to one unfamiliar with butane carburetion but in a short time each function breaks itself down into a number of interesting little problems. Any good engine mechanic can quickly accustom himself to B-P Gas and its application to engine use. Bottled gas has long been used in almost every town and village. The engine application is very little more complicated.

Strong Similarity Between Engine and Domestic Household Uses.

In either case, vaporized butane or propane, must be made available in volumes and pressures for good combustion. In the home appliance, vapor is combined with air at the burner. It is proportioned

It's here!

The complete postwar picture of home heating



What is the market for home heating? . . . What type of heating do people prefer? . . . What's the story on the complete, new line of gas heating equipment being made available by Bryant Heater?

"Postwar Picture of Home Heating" is a factual presentation which will answer these and other questions confronting those whose responsibility is the design, construction or equipping of America's postwar homes.

This illustrated, time-conserving presentation gives you the facts about the future for residential heating. It estimates the new and replacement heating market, tells of the trend toward gas heating as proved by accurate and impartial surveys, of the complete Bryant line of gas heating equipment which will meet the demands of this great new market.

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Use—
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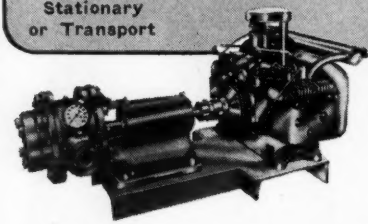
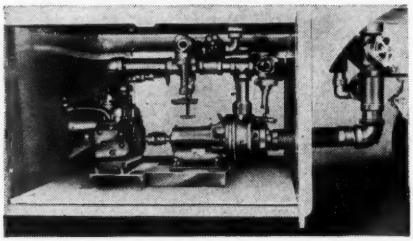


When electricity or motors are not available or practical, use this gasoline engine driven pumping unit for moving LP Gas.

Assembly includes: 2 cylinder, 4 cycle, aircooled, 4 HP VAPOR-SAFE gasoline engine with enclosed magneto, shielded spark plugs and downdraft carburation; Pump is turbine type for propane pumping and will handle a million gallons without appreciable wear; both are assembled as compact unit on a welded steel base, connected with flexible coupling and provided with flexible exhaust hose, 5 gallon container and 300 lb. pressure gauge.

Available now in limited quantities!



Above is shown installation of 75 GPM Corken Unit on Propane Transport which affords safety, flexibility, faster unloading and lower maintenance. Unit may also be used as a stationary installation for bulk plant operation.

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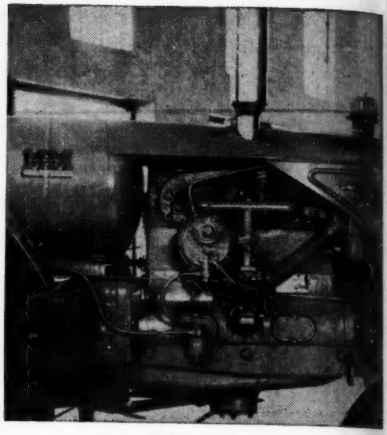


Fig. 5. Typical installation of butane equipped tractor. Illustration indicates liquid line from butane tank, liquid filter, vaporizer and low pressure regulating unit and straight gas carburetor. Also shown are cold inlet manifold, water line to vaporizer from cylinder head and air inlet tube from air cleaner.

and mixed right at the gas jet. This function is comparable to the carburetor on the engine. In the home appliance the vaporized butane or propane must be regulated in pressure before passing to the gas jet. A small pressure regulator is used between the bottles and the appliance.

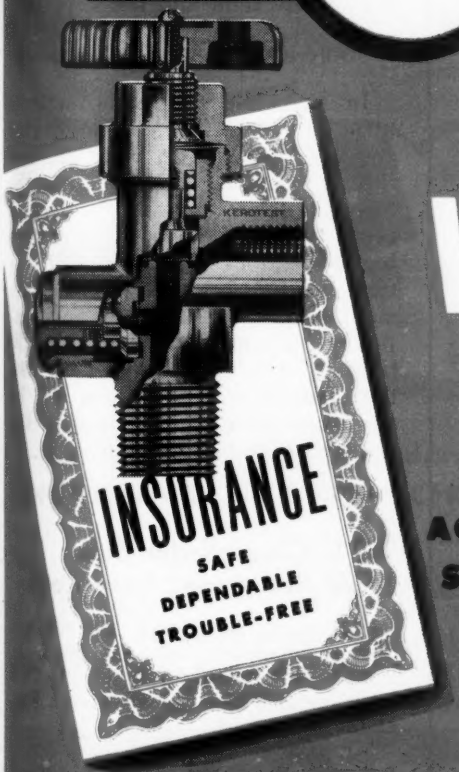
Likewise, in the engine adaptation, a final pressure regulator is used ahead of the carburetor for the same purpose as used in the household appliance. Were it practical to use tank vapor for the engine instead of drawing off the liquid, there would be no need for the vaporizer as previously pointed out. Then the domestic and engine applications would be almost identical.

The butane vaporizer is simply

CHOOSE

KEROTEST

REGISTERED U. S. PAT. OFF.



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an extra stage necessary in engine installations. As a matter of fact, a butane vaporizer is sometimes required in household or appliance installations where butane instead of propane is used and/or where atmospheric temperatures become so low that tank pressure is insufficient to force the gas through the system, in which event a vaporizer similar to the engine installation is used with a primary pressure regulator usually installed between the butane tank and the vaporizer.

Difference Lies in Application

In principle, there is actually little difference between the engine and the domestic installation. But the methods used in applying the principle must differ considerably because of widely changing operating conditions encountered in engine carburetion in order to attain maximum power, economy and flexibility. These methods of "conditioning" the fuel in each of the four stages for engine use will be examined after a brief study of the engine fuel tank and its details.

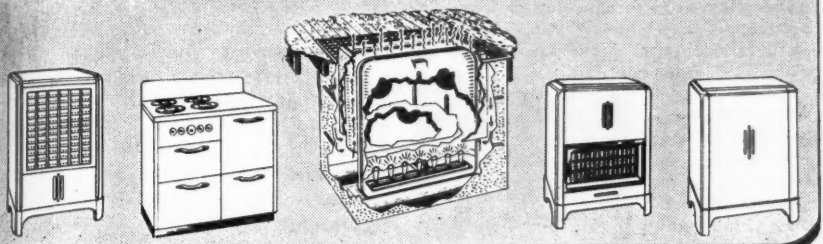
TO BE CONCLUDED NEXT MONTH

W. S. Cadwallader Dies After Retirement from Roper

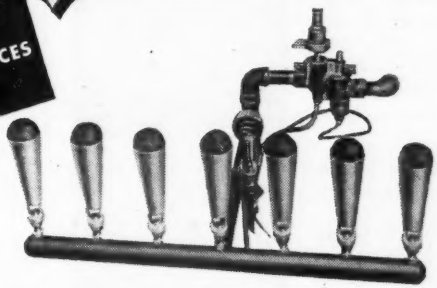
Following retirement as Chicago district manager for the Geo. D. Roper Corp. on Nov. 1, W. S. Cadwallader died Dec. 27, at Miami, Fla., at the age of 58.

Mr. Cadwallader has been with Roper 19 years. As district manager, he was in charge of the metropolitan Chicago area, and his 40 years in the gas industry made him one of the best known men in the field.

Plan *Now* to sell the *Empire* line with the remarkable new *Empire* GAS BURNER



Performance of this Burner Gives
EMPIRE'S HEATING APPLIANCES
EXTRA SALES VALUE



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Ready in February

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Gas RANGES, GAS RADIANT CIRCULATOR HEATERS, FORCED-AIR CIRCULATOR HEATERS and CLOSET-TYPE GAS Furnaces

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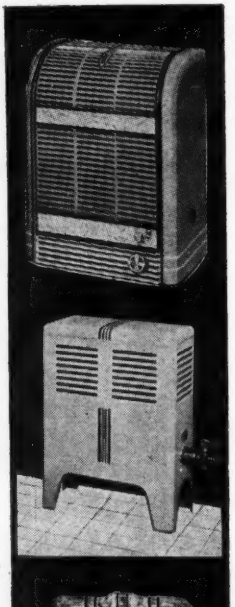
Through the war years, our reconversion plans were set for a rapid turnover to civilian goods. Now we're in full swing on peacetime production. Don't delay! Ask your jobber about the popular Armstrong heaters and place your order now.



- **No. 900 Circulating-Radiant Heater.** Designed for proper combustion to produce both radiant and circulating heat. Brown porcelain enamel finish 19" high, 18,000 or 28,000 B.T.U.
- **No. 10-C Bathroom Heater.** 1-piece body finished in white porcelain enamel. Cast iron burner, adjustable air mixers. 14½" high.
- **No. 690 Radiant Heater.** Finished in brown vitreous enamel. 17¾" high. 20,000 or 24,000 B.T.U.

ARMSTRONG PRODUCTS CORP.

Quality Since 1899

Dept. PB **Huntington, W. Va.**

THE TRADE

The **Mission Water Heater Corp.**, Los Angeles will henceforth be known as the Mission Appliance Corp.

"The reason for the change," says A. H. Sutton, president, "is that the original name of Mission Water Heater Corp. is too restricted. It implies that the company is limited to water heater manufacture. It is planned, some time in the future, that other products besides water heaters will be added to the line, and therefore the new name of Mission Appliance Corp. will be more appropriate for this wider variety of products."

A. H. SUTTON

F. W. Carter, president of Peerless Manufacturing Corp., announces the return of Thomas D. Bromley, manager of the gas-fired heating equipment division.

Mr. Bromley has been serving with the United States Navy since October, 1943.

Prizes totaling $275 have been awarded to winners in the recent "Ideas for Research on Liquefied Petroleum Gas Range" contest conducted by the **Tappan Stove Co.**

First prize of $100 was awarded to D. W. McPike, Chapman Gas Service Co., Oneida, N. Y. Other winners were: F. T. Benson, Benson's Store, Greenup, Ill., second prize, $75; Mrs.

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hen you UNLOAD TANK CARS make sure they're EMPTY!

r all liquid petroleum has been transferred n a tank car or tank truck there is still a siderable quantity of vapor left in the tank. s cannot be recovered by a liquid pump. This or amounts to from 500 to 1000 lbs. of LP in every tank car unloaded! You pay for lost poundage as well as its transportation!

s vapor can be recovered with the Brunner Gas Unit, a compressor assembly that pumps tile liquids and recovers their residue vapor. a package unit that is outstanding in speed, iency, safety and low cost.

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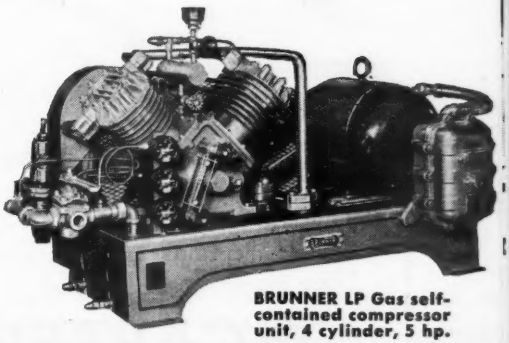

BRUNNER LP Gas self-contained compressor unit, 4 cylinder, 5 hp.

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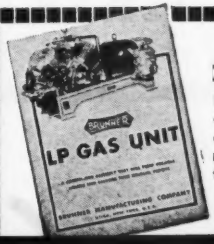

WRITE FOR THIS NEW FREE BOOKLET

It describes the Brunner LP Gas Uni and contains more illustrations, di agrams, tables and valuable infor mation on the handling of LP Ga than any booklet ever issued.

P. S. Guildner, P. S. Guildner Co., Grant, Nebr., third prize, $50, and special awards of $25 each were given to Lester Hanken, Timken Lumber Co., Timken, Kans., and P. A. Smith, Smith Butane Equipment Co., Pine Bluff, Ark.

The recent contest was conducted among Tappan liquefied petroleum dealers who expressed their ideas on development of the Tappan LP-Gas range.

The Neptune Meter Co. announces that Herbert B. Brown has returned to the Chicago branch from active duty as a captain with the 23rd Tank Destroyer Group No. 9.

Before joining the Army in 1942, he was with the company for six years. During that time he was service manager at the Chicago office and was later promoted to sales engineer for the Chicago area.

The Neptune Meter Co. also announces that W. Creighton Brown Jr., has rejoined the company's sales staff after having served over three years with the Army. His territory will be the State of Missouri, with headquarters at the Kansas City office.

For five years prior to joining the Army Mr. Brown was a sales engineer with Neptune in the State of Nebraska.

New additions to the sales staff of the **Ruud Manufacturing Co.**, of Pittsburgh, Pa., makers of gas water heaters, are A. L. Rothrum, R. E. Cade, Robert Spear and Robert Hitchings.

Mr. Rothrum has been on leave of

Butane & Propane

Carter

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IN LPG MARKETS

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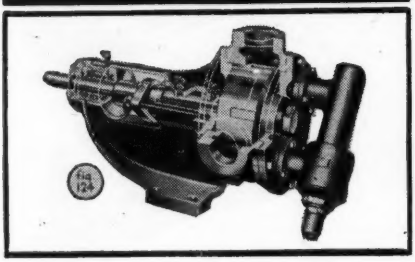
It has been estimated by competent authorities that 13,000,000 homes beyond the city gas mains are prospects for the economical convenience of home gas systems. In farm papers of the Midwest, Butler advertising is creating the demand for Butler LPG delivery service. This advertising will be extended as capacity for the production of Butler Home Gas Systems overcomes a tremendous backlog demand. Butler factories are prepared to meet nationwide needs for LPG Truck and Trailer Transports.

BUTLER MANUFACTURING COMPANY

7410 East 13th Street, Kansas City 3, Missouri

VIKING Says **"NO"**
So You Will Say **"YES"**



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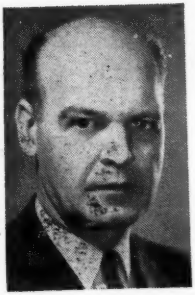
CEDAR FALLS, IOWA

absence to the Office of Price Administration during the war and has now returned to the Ruud district manager ship of Florida and southern Georgia. Headquarters will be maintained in Jacksonville, Fla.

Mr. Cady has recently been associated with the Lennox Furnace Co. and several mid-western gas utilities and now joins Ruud as district manager of Texas and New Mexico. He has established headquarters at Fort Worth, Texas.

As yet unassigned are Robert Spear and Robert Hitchings.



JERRY FRENCH

The Bastian Blessing Co. Chicago, manufacturer of liquefied petroleum gas equipment, has appointed Jerry French public relations director for the "Regg division, announces Ellsworth L. Mills, vice president of the company.

Mr. French, who has been with the firm for several years, was former publisher of the "Merchandise Mart Review," a business magazine sponsored by Marshall Field & Co. He will head up a greatly expanded advertising and publicity program for The Bastian-Blessing Co.

Announcement has been made by **American Car and Foundry Co.** of the recent election of new vice presidents of this company. These officers are W. Lyle Richeson, Frederick H. Norton, Philip A. Hollar, R. A. Williams, vice president, is in charge of sales.

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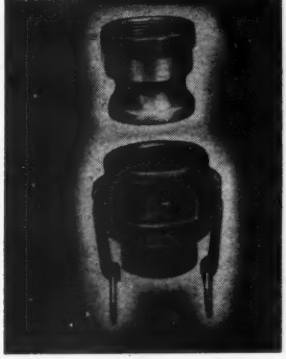

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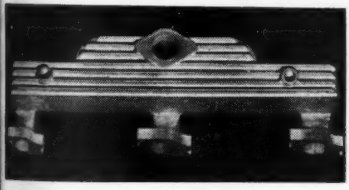

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American Pipe and Steel Corp.....105
American Stove Co..... 67
Anchor Petroleum Co..... 3
Armstrong Products Corp.....132

Barber Gas Burner Co., The.....141
Bastian-Blessing Co., The.....72, 73
Blickman, Inc., S..... —
Blodgett Co., Inc., The G. S...Fourth Cover
Borg-Warner Corp., Norge Div..... 9
Brodie Co., Inc., Ralph N.....138
Brunner Manufacturing Co.....133
Bryant Heater Co.....127
Buehler Tank and Welding Works.....139
Butane Equipment Co., Inc.....140
Butler Manufacturing Co.....135

Carter Oil Co., The.....134
Century Gas Equipment Co.....141
Chicago Bridge & Iron Co..... 65
Cities Service Oil Co.....130
Clayton & Lambert Mfg. Co..... 12
Commercial Shearing & Stamping Co...141
Corken's 128
Cribben & Sexton Co..... 55

Dallas Tank Co., Inc..... 57
Day & Night Manufacturing Co..... 63
Dearborn Stove Co.....137
Detroit-Michigan Stove Co..... —
Dix Manufacturing Co.....138
Downingtown Iron Works..... —
Dresser Industries, Inc.....18, 63, 127
Duke Manufacturing Co.....142

Electric & Carburetor Engineering Co..119
Ellis Manifold Co.....143
Empire Stove Co.....131
Ensign Carburetor Co.....116
Estate Stove Co.....109
Ever-Tite Coupling Co.....143

Fisher Governor Co..... 79
Florence Stove Co..... 60

Gas Equipment Co., Inc.....139
Gas Equipment Supply Co.....139
General Controls.....93
General Gas Light Co..... —
Graham Manufacturing Co., James.... 95
Grand Home Appliance Co..... —
Grayson Heat Control, Ltd.....101
Graver Tank & Mfg. Co.....120

Harper-Wyman Co.....6, 7
Hays Manufacturing Co..... —

Kalamazoo Stove Co..... —
Kerotest Manufacturing Co.....129

Lancaster Iron Works, Inc..... 91
L. G. E. Corp.....140
Lindemann, A. J., & Hoverson Co..... —

Mallinckrodt Chemical Works.....139
McNamar Boiler & Tank Co..... 77
Milwaukee Gas Specialty Co..... —
Mission Appliance Corp..... 97
Mosher Steel Co.....106
Moulden Supply Co.....142

National LP-Gas Institute.....133
Neptune Meter Co..... 59

Ohio Foundry & Manufacturing Co....140
O'Keefe & Merritt..... 22
Oxford Co., The.....107

Payne Furnace Co..... 18
Peerless Pump Division.....124
Phillips Petroleum Co..... 83
Pitman & Sons Sales Corp., J. C.....143
Pittsburg Water Heater Corp..... —
Pittsburgh Equitable Meter Division,
Rockwell Mfg. Co..... 1
Pressed Steel Tank Co.....Second Cover

Radiator Specialty Co.....123
Ransome Co., The..... 68
Reliance Regulator Corp..... 15
Reznor Manufacturing Co.....106
Rheem Manufacturing Co.....121
Robertshaw Thermostat Co..... 16
Rochester Manufacturing Co., Inc....4, 5
Roney, Inc., L. C..... 69
Roper Corp., Geo. D. (Pumps) 90
Roper Corp., Geo. D. (Ranges) Third Cover
Rose & Co., Inc., J.....140
Ruud Manufacturing Co..... —

Savory Equipment, Inc..... 71
Scaife Co.....Front Cover
Schoenberger Co., The W. J..... 88
Schutte & Koerting Co.....122
Servel, Inc.....10, 11
Sinclair Prairie Oil Co.....137
Smith Precision Products Co..... 46
Southern Gas & Equipment Co.....118
Sprague Meter Co., The..... —
Standard Gas Equipment Corp..... —
Superior Tank & Construction Co.....138
Superior Valve & Fittings Co.....117

Tappan Stove Co., The.....100
Tennessee Enamel Manufacturing Co... —
Trageser Copper Works, Inc..... 97

United States Heater Co.....139

Viking Pump Co.....136

Ward Heater Co..... 96
Warren Petroleum Corp..... 74
Weatherhead Co., The..... —
Welbilt Stove Co., Inc..... 85
Western Gas Equipment Co.....118
Whitehead Metals Products Co..... —
Williams Radiator Co.....126